

6 1542 60

# CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

50013  
Cover

14

Volume 9

Sacramento, January, 1923

Number 1





# BOARD OF FISH AND GAME COMMISSIONERS.

Commissioners appointed by the Governor, by and with the consent of the Senate.

Term at pleasure of Governor. No compensation.

|                             |               |
|-----------------------------|---------------|
| F. M. NEWBERT, President    | Sacramento    |
| M. J. CONNELL, Commissioner | Los Angeles   |
| E. L. BOSQUI, Commissioner  | San Francisco |

|                                           |               |
|-------------------------------------------|---------------|
| GEORGE NEALE, Executive Officer           | Sacramento    |
| J. S. HUNTER, Assistant Executive Officer | San Francisco |
| R. D. DUKE, Attorney                      | San Francisco |

## DEPARTMENT OF FISHCULTURE.

|                                                                                                  |                |
|--------------------------------------------------------------------------------------------------|----------------|
| W. H. SHEBLEY, In Charge Fishculture                                                             | Sacramento     |
| E. W. HUNT, Field Superintendent                                                                 | Sacramento     |
| A. E. DONEY, Fish Ladder Inspector                                                               | Sacramento     |
| A. E. CULVER, Screen Inspector                                                                   | Sacramento     |
| M. K. SPALDING, Assistant in Charge of Construction                                              | Sacramento     |
| G. H. LAMBSON, Superintendent Mount Shasta Hatchery and Klamath River Stations                   | Sisson         |
| W. O. FASSETT, Superintendent Fort Seward Hatchery, Eel River, Ukiah, and Snow Mountain Stations | Ukiah          |
| G. McCLOUD, JR., Superintendent Mount Whitney Hatchery and Cottonwood Lakes Station              | Independence   |
| G. E. WEST, Foreman in Charge Tahoe and Mount Tallac Hatcheries                                  | Tallac         |
| C. NIXON, Foreman Mount Shasta Hatchery                                                          | Sisson         |
| E. V. CASSELL, Foreman in Charge Fall Creek Hatchery                                             | Copco          |
| L. J. STINNETT, Foreman in Charge Bogus Creek Station                                            | Copco          |
| J. C. BRANDENBURG, Foreman in Charge Bear Lake and North Creek Hatcheries                        | San Bernardino |
| GUY TABLER, Foreman in Charge Wawona Hatchery                                                    | Wawona         |
| CHAS. L. FRAME, Foreman in Charge Brookdale Hatchery                                             | Brookdale      |
| J. LANDY, Foreman in Charge Domingo Springs and Clear Creek Hatcheries                           | Mineral        |
| J. C. LEWIS, Foreman in Charge Fort Seward Hatchery                                              | Aldenpoint     |
| J. W. RICKER, Foreman in Charge Snow Mountain Station                                            | Potter Valley  |
| J. SHEBLEY, Foreman in Charge Feather River Hatchery                                             | Johnsville     |
| ED. CLESSENS, Foreman in Charge Kaweah Hatchery                                                  | Hammond        |
| L. PHILLIPS, Superintendent of Car No. 01                                                        | Sisson         |
| G. McCLOUD, SR., Superintendent of Car No. 02                                                    | Sisson         |

## DEPARTMENT OF COMMERCIAL FISHERIES.

|                             |               |
|-----------------------------|---------------|
| N. B. SCOFIELD, In Charge   | San Francisco |
| H. B. NIDEVER, Assistant    | San Pedro     |
| W. F. THOMPSON, Assistant   | San Pedro     |
| ELMER HIGGINS, Assistant    | San Pedro     |
| EARLE DOWNING, Assistant    | San Francisco |
| S. H. DADO, Assistant       | San Francisco |
| C. S. BAUDER, Assistant     | San Pedro     |
| P. H. OYER, Assistant       | Monterey      |
| COBURN F. MADDOX, Assistant | San Diego     |

## DEPARTMENT OF WATER POLLUTION.

|                            |               |
|----------------------------|---------------|
| A. M. FAIRFIELD, In Charge | San Francisco |
|----------------------------|---------------|

## BUREAU OF EDUCATION, PUBLICITY AND RESEARCH.

|                             |          |
|-----------------------------|----------|
| DR. H. C. BRYANT, In Charge | Berkeley |
|-----------------------------|----------|

# CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 9

SACRAMENTO, JANUARY, 1923

Number 1

## CONTENTS.

|                                                                                  | Page                         |
|----------------------------------------------------------------------------------|------------------------------|
| A SECOND REPROT ON THE RETURN OF SALMON MARKED IN 1915,<br>IN KLAMATH RIVER----- | <i>J. O. Snyder</i> 1        |
| THE IDENTIFICATION OF TROUT-----                                                 | <i>J. O. Snyder</i> 10       |
| CALIFORNIA'S LARGE GAME ANIMALS-----                                             | <i>M. Hall McAllister</i> 11 |
| THE BLACK BEAR IN RELATION TO STOCK-----                                         | <i>J. Bruce</i> 16           |
| SALMON FISHCULTURAL OPERATIONS ON THE KLAMATH<br>RIVER -----                     | <i>H. C. Bryant</i> 19       |
| EDITORIALS -----                                                                 | 24                           |
| FACTS OF CURRENT INTEREST-----                                                   | 37                           |
| NOTES FROM THE STATE FISHERIES LABORATORY-----                                   | 40                           |
| CONSERVATION IN OTHER STATES-----                                                | 41                           |
| UNITED STATES FOREST SERVICE COOPERATION-----                                    | 43                           |
| REPORTS -----                                                                    | 44                           |
| EXPENDITURES -----                                                               | 44                           |
| FISHERY PRODUCTS-----                                                            | 38                           |

## A SECOND REPORT ON THE RETURN OF KING SALMON MARKED IN 1919, IN KLAMATH RIVER.

By J. O. SNYDER, Stanford University.

In the fall of 1919 a marking experiment was undertaken at the request of Mr. W. H. Shebley, in charge of fishculture, the purpose of which was to obtain additional facts relating to the life history of artificially propagated king salmon. Eggs were taken from Mill Creek, a tributary of the Sacramento River, in November, 1918, and hatched at Fall Creek Hatchery on the Klamath River in February, 1919. Approximately 250,000 of the resulting fry were placed in a rearing pond connected with the hatchery. These were fed and cared for until November, 1919, when they were liberated in Klamath River. In the meantime 25,000 of them were marked by removing the adipose and right ventral fins.

It is presumed that these fish, both marked and unmarked, made their way down the river and entered the sea shortly after liberation. However, nothing was learned of them until the latter part of October, 1920, when some appeared at the racks in Klamath River, a short distance from Hornbrook. Between October 24 and November 14, twenty-



three fish, then three-year-old grilse, bearing the mark of this experiment were secured. An account of the experiment and the results obtained to date appeared in CALIFORNIA FISH AND GAME, Vol 8, No. 2.

It was expected that four-year fish of the same lot would be taken during the following season, 1922, and considerable effort was made to secure the cooperation of fishermen and others in obtaining data relating to them.\*

Scales and mutilated fins of 7 examples caught at sea, one in the estuary of Klamath River, and fifteen from the racks near Hornbrook, were collected. Reports were received of others having been seen, and also a few deformed fins from fish which had evidently met with accident were examined. Collectors' data relating to the marked fish are here assembled.

TABLE 1.

Summary of collector's data relating to marked fish taken in 1922.

| Number----- | Date    | Locality                         | Sex | Length,<br>centimeters | Weight,<br>pounds | Collector                                                        |
|-------------|---------|----------------------------------|-----|------------------------|-------------------|------------------------------------------------------------------|
| 21751       | June 7  | Monterey Bay-----                | F.  | 75                     | 9½                | A. Paladini Co., E. M. Nielsen.                                  |
| 21752       | June 14 | Monterey Bay-----                | M.  | 79                     | 14½               | L. Canepa, Boat 85, A. Paladini Co., E. M. Nielsen.              |
| 21756       | July 21 | Near Redding Rock-----           | F.  | 64                     | 7½                | Western California Fish Co.                                      |
| 21757       | Aug. 1  | Near Redding Rock-----           | F.  | 73                     | 10½               | E. C. Scofield.                                                  |
| 21758       | Aug. 3  | Near Redding Rock-----           | M.  | 73                     | 11½               | E. C. Scofield.                                                  |
| 21759       | Aug. 3  | Near Redding Rock-----           | F.  | 77                     | 11½               | E. C. Scofield.                                                  |
| 21760       | Aug. 5  | Near Cape Mendocino-----         | M.  | 74                     | 10½               | E. C. Scofield.                                                  |
| 39386       | Aug. 14 | Klamath Estuary-----             | F.  | 72                     | 10                | {Klamath River Packing Assn.<br>} Frank A. Douglas.              |
| 21762       | Oct. 19 | Klamath racks near Hornbrook---- | F.  | 79                     | {                 | {Fish and Game egg taking<br>station, E. V. Cassel in<br>charge. |
| 21763       | Oct. 28 | Klamath racks near Hornbrook---- | M.  | 77                     |                   |                                                                  |
| 21764       | Oct. 30 | Klamath racks near Hornbrook---- | M.  | 69                     |                   |                                                                  |
| 21765       | Oct. 31 | Klamath racks near Hornbrook---- | F.  | 74                     | -----             | E. A. McGregor.                                                  |
| 21763       | Nov. 1  | Klamath racks near Hornbrook---- | M.  | 64                     | -----             | E. A. McGregor.                                                  |
| 21767       | Nov. 3  | Klamath racks near Hornbrook---- | M.  | 84                     | -----             | E. A. McGregor.                                                  |
| 21768       | Nov. 6  | Klamath racks near Hornbrook---- | M.  | 84                     | -----             | E. A. McGregor.                                                  |
| 21769       | Nov. 8  | Klamath racks near Hornbrook---- | M.  | 80                     | -----             | E. A. McGregor.                                                  |
| 21770       | Nov. 8  | Klamath racks near Hornbrook---- | M.  | 68                     | -----             | E. A. McGregor.                                                  |
| 21771       | Nov. 8  | Klamath racks near Hornbrook---- | F.  | 86                     | -----             | E. A. McGregor.                                                  |
| 21772       | Nov. 9  | Klamath racks near Hornbrook---- | F.  | 86                     | -----             | E. A. McGregor.                                                  |
| 21773       | Nov. 10 | Klamath racks near Hornbrook---- | M.  | 84                     | -----             | E. A. McGregor.                                                  |
| 21774       | Nov. 10 | Klamath racks near Hornbrook---- | F.  | 80                     | -----             | E. A. McGregor.                                                  |
| 21775       | Nov. 11 | Klamath racks near Hornbrook---- | M.  | 83                     | -----             | E. A. McGregor.                                                  |
| 21776       | Nov. 15 | Klamath racks near Hornbrook---- | F.  | 74                     | -----             | E. A. McGregor.                                                  |

Among other things, this experiment has served to demonstrate beyond doubt that king salmon may range a long distance at sea from the mouth of the parent stream, a matter of great importance in relation to conservation. The salmon caught in Monterey Bay, off San Francisco, and in the Sacramento River have heretofore been considered as a unit statistically and otherwise, in accordance with the supposition that all were a product of the Sacramento basin. This view must now be

\* Wardens whose stations were near the coast, were on the lookout from Monterey to Crescent City. E. A. McGregor and E. C. Scofield acted as special observers at Fort Bragg and Eureka; the writer was stationed at the mouth of Klamath River. McGregor was present at the spawn-taking operations near Hornbrook, and finally, willing cooperation and aid were rendered by many fishermen, dealers, and packers.

abandoned, for it was recently shown that Sacramento salmon may migrate northward at least to Shelter Cove, and now there is evidence that Klamath salmon contribute to the catch of Monterey Bay. The experiment also lends aid to the theory that king salmon return to the stream in which they were liberated, regardless of where the eggs were taken.

It will be seen that the sex representation among the marked fish recovered this season is practically even, there being 12 males and 11 females.

The average length of those caught at sea was about 73.5 centimeters, while the mature examples taken later in the river measured about 78. This is similar to the growth attained by stream fish of natural propagation as shown by 60 examples selected at random from the catch of 1919 at the mouth of the Klamath. The sexes of these were equally represented, and they were fish which had spent the greater part of the first year in the river, as indicated by the structure of the scales. The lengths varied from 65 to 80 centimeters, the average being 73.

It will be of interest to continue with similar comparisons. It has been shown that in most cases the size of a salmon at any stage of its growth, may be approximately computed if the length of the fish is known, and some of its scales are available for examination.\* The method employed takes advantage of the fact that the scale grows in proportion with the rest of the body, and the structure of the scale is such that it preserves a record of some of the chief incidents in the life of the fish in such a way as to often admit of more or less accurate interpretation. The growth of the scale proceeds from a nuclear center outwards, in concentric rings, forming a succession of minute ridges, each of which for a short time represents the edge or contour of the scale. The scale thus presents in miniature a picture or sketch of the life history of the fish, which records certain events in regular succession. If the growth is rapid and uninterrupted, for a time; the rings are broad and even; if for any reason the growth is retarded, the rings will be narrow or closely crowded.

Figure 2 is a photomicrograph of a portion of a salmon scale (No. 21751 in Table 1) including the nucleus and parts of the opposite edges. The small oval x, represents the scale when it first appeared in the skin, the fish then being approximately 4 centimeters long. The point A marks the edge of the scale when the fish was released from the breeding pond. From A to D is the growth to what may be termed the end of the second year; to E the end of the third year; from E to F, a part of the fourth year. Since the scale grows in proportion with the rest of the fish, the length of the fish at any time will bear a definite relation to the length of the scale at that time. For example, the length of the fish at the end of the third year, is to the length of the scale at the end of the third year, as the present length of the fish, is to the present length of the scale; in this case,  $L:92::75:128$ , giving about 54 centimeters as the length of the fish when three years old. In this calculation no account was taken of the growth represented by the small area marked X in the figure, a matter of about

\*Dahl, Knut; The age and growth of salmon and trout in Norway as shown by their scales—London, 1910. The method described by Dahl has been employed by Doctor C. H. Gilbert and others in investigations of western salmon.



four centimeters. With this correction the computed length at the end of the third year would be about 55 centimeters. Here the measurements were made of a magnified image instead of the scale itself, and in practice the camera lucida is used.

A table of computed lengths at three stages of growth of the marked fishes taken at sea and in the Klamath estuary\* follows:

TABLE 2.

| Number        | First year | Second year | Third year | Fourth year<br>(actual length) |
|---------------|------------|-------------|------------|--------------------------------|
| 21751 -----   | 7.3        | 36          | 55         | 75                             |
| 21752 -----   | 7.9        | 34          | 58         | 79                             |
| 21756 -----   | 8          | 31          | 53         | 64                             |
| 21757 -----   | 8.5        | 31          | 56         | 73                             |
| 21758 -----   | 9.9        | 28          | 51         | 73                             |
| 21759 -----   | 7.2        | 34          | 60         | 77                             |
| 21760 -----   | 8.3        | 31          | 50         | 74                             |
| 39386 -----   | 7.2        | 31          | 56         | 72                             |
| Average ----- | 7.9        | 32          | 55         | 73                             |

According to the table, these individuals measured on the average about 7.9 centimeters when liberated in the river, 32 when two years old, 55 when three years old, and 73 when they met death in the fourth year. These calculated measurements compare favorably with those obtained in another way as will be seen. One hundred fingerlings were taken at random from those liberated in 1919. These measured from 7.1 to 11 centimeters, the average being about 8.5. Fifty fish in the third year, and with a similar stream history, taken in Monterey Bay between April 25 and June 27, averaged about 55 centimeters. Also measurements like those given in the above table were computed from the scales of 60 four-year-old Klamath River examples with a similar stream history, resulting as follows:

|                       | First year | Second year | Third year | Fourth year |
|-----------------------|------------|-------------|------------|-------------|
| Average males -----   | 12         | 35          | 55         | 71          |
| Average females ----- | 11         | 34          | 57         | 74          |

From these comparisons it seems safe to infer that the growth of these pond-reared fish has progressed at about the same rate as others, and that when mature they reached about the same size.

The return of three-year fish bearing the mark of 1919 was noted on a previous page. These fish were distinguished by a peculiar and characteristic second year record borne by their scales, an illustration of which is presented as figure 3. Like that shown in figure 2, this scale has a nuclear area A, beyond which the rings are wider and very regular to the point B. From B they are still wider to C, where a check in growth is recorded by a space of two or three irregular and narrow rings. Beyond this the growth is resumed, only to be checked again at D. The space between A and D represents the growth from the time the fingerlings were liberated until the end (winter) of the second year. It is very probable that the check B occurred during the

\*Scales from fishes approaching the spawning period, like those taken at the racks near Hornbrook, are too badly absorbed or frayed along the edges to be useful in this way.

first winter, about the time the fish was one year old, the entire growth of the first year being from A to B. However, speculation as to the time or cause of the checks B or C is of little moment compared with the mere fact of their presence, not only in the scales referred to, but also in all but three of the 46 fish (two more are illustrated in figure 4) which were captured last year and this, bearing the 1919 mark. These checks are to be interpreted as the records of certain events which retarded the growth of each of these fishes at the same time and in a similar way, and their presence in all, or nearly all, would lead one to infer that they were closely associated during the second year. Some explanation other than exposure to the same environment during the growth of the second year may perhaps be found for the remarkable similarity of scale structure in all these individuals, but none more simple or plausible comes to the writer at this time.

As the marked fish were only a small part of the 250,000 liberated at the same time, it was suspected that many unmarked individuals might be associated with the marked ones wherever the latter were found, and that such might be recognized if they possessed the same peculiar scale structure as the marked ones. Accordingly, on the day when the first marked one appeared in the estuary of Klamath River, the scales of many other fish were examined, but without success. It was like searching for the proverbial needle in a haystack, for there were at the time, 4632 large fish on the cannery floor. However, better results followed an examination of the sea catches. As the Eureka observer, Mr. Scofield, discovered marked fishes, he preserved scales from all other individuals in the same boat, and a search among 155 of these revealed six which the writer is satisfied may safely be regarded as fishes of the 1919 planting. A scale of one of these is illustrated as figure 5, and it is only necessary to place it alongside of figures 3 and 4 to be convinced of its detailed structural resemblance to them. Collector's data relating to these are here tabulated.

TABLE 3.

| Number | Date     | Locality                   | Sex    | Length |
|--------|----------|----------------------------|--------|--------|
| 41853  | August 1 | Vicinity Redding Rock----- | male   | 66     |
| 41854  | August 1 | Vicinity Redding Rock----- | male   | 77     |
| 41995  | August 5 | Off Cape Mendocino-----    | female | 69     |
| 41997  | August 5 | Off Cape Mendocino-----    | female | 67     |
| 42021  | August 5 | Off Cape Mendocino-----    | female | 72     |
| 42043  | August 5 | Off Cape Mendocino-----    | female | 87     |

Each of these fish was in its fourth year. Measurements similar to those presented in Table 2 are here recorded for purposes of comparison:

TABLE 4.

| Number        | First year | Second year | Third year | Fourth year<br>(actual length) |
|---------------|------------|-------------|------------|--------------------------------|
| 41853 -----   | 9.5        | 37          | 47         | 66                             |
| 41854 -----   | 10         | 39          | 65         | 77                             |
| 41995 -----   | 10         | 35          | 54         | 69                             |
| 41997 -----   | 10         | 30          | 49         | 67                             |
| 42021 -----   | 9          | 29          | 55         | 72                             |
| 42043 -----   | 9.5        | 32          | 58         | 87                             |
| Average ----- | 9.6        | 34          | 55         | 73                             |



The structure of that part of the scale produced during the third and fourth years offers nothing peculiar or distinctive. The time and place of capture of the marked fish do not disturb the supposition that they may have all been taken from the same large school which was passing along the coast in pursuit of food. The first marked fish of the season were caught in Monterey Bay in June. They were next met far to the north near Redding Rock, then off Cape Mendocino at a later \*date, in the estuary of the Klamath, August 14, and finally in the upper Klamath River in October and November.

It is probable that others of this planting still remain in the sea, either to be caught during the coming season or to return to the spawning grounds later in the year.

\*The table, No. 1, gives July 21 to August 3, as dates upon which marked fish were taken at Redding Rock, and August 5 as the time of catching those at Cape Mendocino. These were the dates of arrival of the fish at Eureka. Either may have been taken a day earlier.

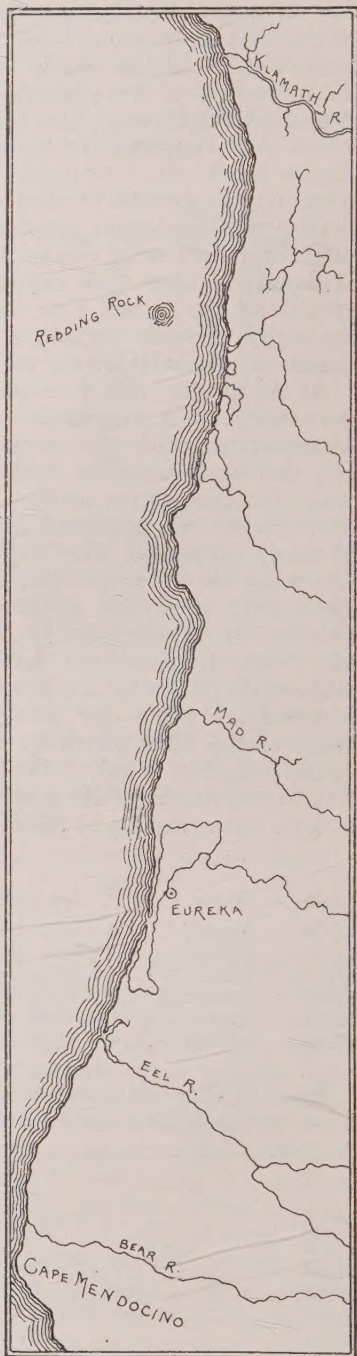


FIG. 1. Map of northern California coast, showing mouth of Klamath River and salmon fishing grounds.



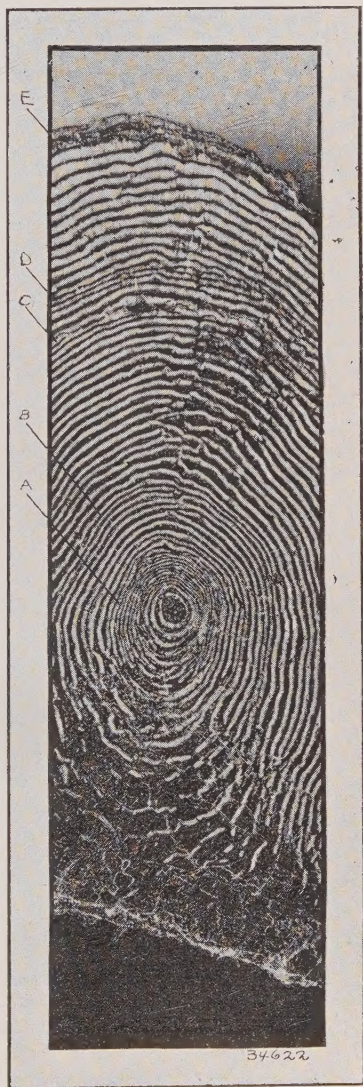
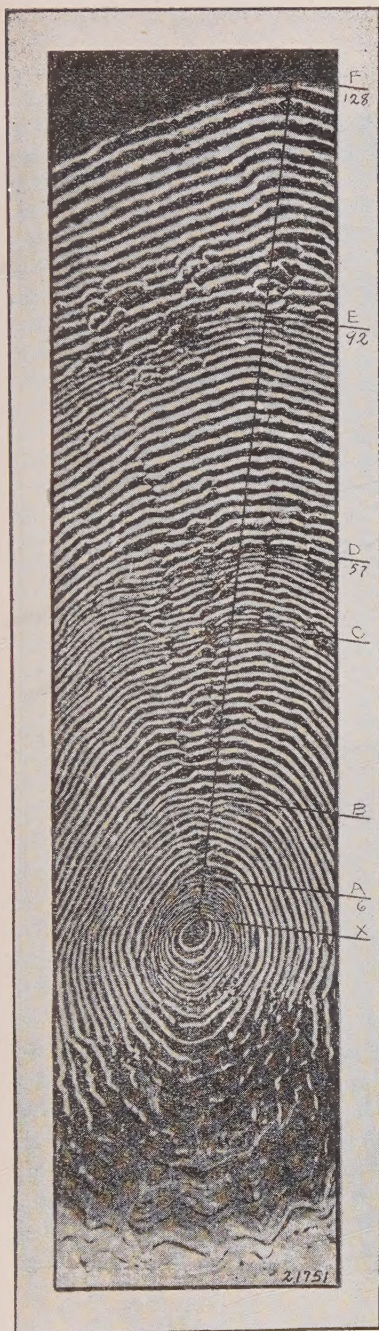


PLATE 1.

FIG. 2. Photomicrograph of a scale from a marked king salmon taken in Monterey Bay, June 7, 1922; a female measuring 75 centimeters in length.

FIG. 3. Photomicrograph of a scale of a marked king salmon which matured in the third year and returned to the upper Klamath River in 1921.





PLATE 2.

FIG. 4. Photomicrograph of scales of two king salmon caught at sea in the fourth year of their age.





PLATE 3.

FIG. 5. Photomicrograph of a scale of a salmon taken off Cape Mendocino, August 5, 1922, which shows convincing structural resemblance to scales of fish of the 1919 planting.

## THE IDENTIFICATION OF TROUT.

By J. O. SNYDER, Stanford University,

Anglers are generally interested in knowing the fish which they catch, and some species, especially the trout, offer considerable difficulty and occasionally cause an appeal for identification to the ichthyologist. In most cases the request is not accompanied with sufficient information to permit of an intelligent answer. Color, particularly that of the flesh, which is extremely variable, is usually emphasized while anatomical structures of importance are overlooked. Professor J. G. Brown of Stanford University lately discovered a method of preparing the necessary data which is at the same time ingenious and efficient.

Four species of trout were being caught by the members of a party of anglers in the high Sierra, and as a result of discussions relative to their identity, a specimen of each was prepared for future reference. Instead of taking off the skin, or salting the fish, or preserving it in spirits—of which the supply was probably low, the fish was simply



FIG. 6. Specimens of rainbow, Tahoe cutthroat, eastern brook and golden trout, suitably preserved for identification.



eviscerated and hung up in the shade. Yellowjackets finished the job, leaving a perfect skin, nicely prepared skeleton, teeth, gillrakers and all, even the cornea of the eye. In all cases the dark pigment of the skin was perfectly preserved, the spots being as plain as in life, and much of the delicate golden tint and the silvery sheen were evident.

Professor Brown relates that when an unusually ambitious yellow-jacket began to gnaw some vital part like the skin along the edge of a cut, or a natural opening of the body, all that was necessary to stop him was the application of a bit of vaseline, not to the bee of course, but to the part that was being eaten.

In the photograph here presented, one is able to recognize the rainbow (No. 1) and the Tahoe cutthroat (4). The skins of the brook trout (2), and also the golden trout (3), were equally well preserved, but the plate was not sensitive to their delicate colors. The incision in the skin of the rainbow permits a section of the nicely cleaned skeleton to be seen. A light spray of an alcoholic solution of corrosive sublimate applied in the laboratory, will protect the specimens from the ravages of insects, and there seems to be no reason why they should not be kept for years.

The rainbow trout was taken in Babcock and Emeric lakes, and also in Fletcher Creek, the brook trout was found in Babcock Lake, the cutthroat came from Emeric Lake and Fletcher Creek, while the golden trout was caught in Fletcher Lake and the creek of the same name. Fishing was reported good, there being an abundance of trout in these lakes and streams. The fish were all introduced, none being natives of the basin which is in the midst of the mountains not far to the eastward of Yosemite Valley.

---

## CALIFORNIA'S LARGE GAME ANIMALS.

By M. HALL McALLISTER.

Under the leadership of the California Academy of Sciences and in cooperation with several Eastern societies a united effort is now being made to regularly care for the various remnants of the great herds of large mammals that formerly ranged over the great West and the states of California, Nevada and Oregon.

A fund is being gotten together by the following subscribers:

The American Bison Society of New York.

New York Zoological Society Wild Life Fund.

California Fish and Game Commission.

United States Forest Service.

California Academy of Sciences.

This money will be handled by a regular committee of the Academy and will be expended for the purposes of winter feed for the herds; salaries of gamekeepers; expenses of forming refugees, and general supervision and observation.

To give an idea of what has already been done in large game conservation and preservation the following will give the details.

*Buffalo*—One hundred years ago these animals ranged over practically the whole of North America from the Appalachian regions in the

East to the Rocky Mountains in the West, and from Canada's muskeg swamps to Mexico's northern plains.

From 1860 to 1870 the herds were estimated:

|                     |           |
|---------------------|-----------|
| Great southern herd | 3,500,000 |
| Great northern herd | 1,500,000 |
| Total               | 5,000,000 |

Say a total of five million animals.

In those days on the western plains these mighty hosts of buffaloes frequently stopped or derailed railroad trains and even obstructed the passage of small river boats on the upper waters of the Missouri and Yellowstone rivers.

In 1869 the Union Pacific Railroad was completed and in about ten years this greatest herd of one species of animal on the globe was completely annihilated. The southern herd on the line of the Union Pacific was first to go; it was savagely attacked by the skin hunters and by 1875, with the exception of three small bunches had all been killed. In 1880 the Northern Pacific was completed and a similar attack was then made on the northern herd and by the end of 1883 they were all slaughtered leaving only the Yellowstone Park herd, which was supposed to number from 100 to 200 head, and a small protected band of 40 in Custer County, Montana.

During 1890 the Yellowstone herd was attacked in the winter by poachers and reduced, some say as low as only twelve, while other estimates were between 20 and 30 head.

Theodore Roosevelt was a plainsman and saw the remnants of the northern herd in Dakota in the early 80's. In his volume "Hunting Trips of a Ranchman" he tells the story of the extermination of the buffalo and shows the head of a bison bull shot by himself in 1883. Roosevelt's brother Elliott Roosevelt, was also quite a buffalo hunter and was in at the death of the great southern herd in 1877.

Roosevelt writes: "It may truthfully be said that the sudden and complete extermination of the vast herds of buffalo is without a parallel in historic times."

There are hundreds of stories of buffalo hunts and hunting, but one of the best was written by General Lew Wallace, author of Ben Hur. He tells of a hunt on the plains of Northern Mexico in 1867. It is a remarkable description in the fact that it is one of the few authentic accounts showing how far south the buffalo migrated. This herd of several hundred animals was found about 300 miles south of the Rio Grande River, in the State of Durango, while General Wallace was making a horseback trip from Monterey and Saltillo across the Coahuila plains to the City of Chihuahua, this journey being approximately along the 26th degree of north latitude. It is, so far as known, the most southerly record of the migrations of the buffalo.

The great English sportsman Sir Samuel Baker visited America in 1881 and writes as follows: "The American bison is a grand looking creature and in my opinion it is the most striking of all wild animals; there is a peculiar savagery in the aspect of a shaggy old bull in its winter coat which surpasses in wildness of appearance all other species of game."



To show what a true sportsman this splendid Englishman was, we quote regarding a buffalo hunt in the year 1881:

"As the bullet struck within a couple of inches of the mark, this magnificent bull plunged heavily to the ground. The three remaining buffalo, all bulls, dashed through the shallow stream, and struggled up the opposing bank. I immediately reloaded and took a lovely aim between the shoulders of each bull, as it exposed itself to a deadly shot which was almost perpendicular within 70 or 80 yards; but I would not fire; I had them completely in my power and that was sufficient. Buffaloes were being destroyed wholesale, and I would not join in the brutal list of destroyers."

He then tells how he stalked from 30 to 40 of these splendid animals which he could have shot with ease, leaving them to rot on the plains, till finally his cowboy guide said: "Well, if you came all the way from the old country to shoot, and you won't shoot when you get the chance, you'd have done better to stop at home." Sir Samuel also did the same with elk and antelope after bagging his first specimens.

He writes further: "The buffaloes on many occasions fed around our camp within 300 or 400 yards. We could watch them with our binoculars and we enjoyed the study of their ways with far greater pleasure than I should have felt in shooting them."

An old time volume "Buffalo Land" published in 1872, describes the trip of a party of New York gentlemen hunters who spent the summer of 1870 in the great West and saw a lot of the destruction which went on. They recite: "During the year 1871, about 50,000 buffalo were killed on the plains of Kansas and Colorado alone. Of this number, it will be correct to estimate that about one-third were shot for their robes, as many more for meat and some 16,000 slaughtered in the name of so-called sport. This book has a series of pictures showing the various modes of slaughter, the titles being:

300 buffaloes a day for pleasure. Sportsmen on horses.

100,000 buffaloes a day for their tongues by Indians.

200,000 buffaloes a day for their robes to get whiskey by the Indians.

Daily for fun; showing shooting into herds from the railroad cars.

Daily for excitement; showing shooting while the herds are crossing the rivers.

The principal hunters and guides all seemed to have the name of Bill tacked on; their guides were Wild Bill (William Hickox); Buffalo Bill (the celebrated William F. Cody), and there was also California Bill, Rattlesnake Bill, and Tiger Bill, and they also heard of Comanche Bill and Apache Bill. But Tiger Bill had the reputation of being the "dangerest on 'em all."

The late C. Jesse Jones, known every where as "Buffalo Jones" in the 70's, did one act which saved at least one bunch from extermination. He and his cowboys roped from the great southern herd a dozen young calves, six bulls and six heifers, and took them in safety to his ranch in Kansas. Also Colonel Charles Goodnight, of Goodnight, Texas, rounded up and saved a bunch of young stock from the same great herd.

As to the size and weight of a full-grown buffalo, Dr. Hornaday of the Bronx Zoo, who is the greatest living authority, bagged a bull in 1886 in Montana which weighed 2100 pounds. This animal is now in the National Museum in Washington. This was the record until the

large bull "Black Dog" which was bred on the government farm at Wichita, Kansas, turned the scale at 2800 pounds.

In the year 1900 the American Bison Society was formed in New York, the object being to endeavor to save this splendid species from total and entire extinction. The personnel comprised the following philanthropic men: Austin Corbin, James J. Hill, W. C. Whitney, Col. Goodnight of Texas, C. Jesse Jones (Buffalo Jones), Colonel W. F. Cody (Buffalo Bill), E. J. Molera of San Francisco, and a number of others.

Their efforts together with the active cooperation of their successors have met with complete success. On the first of January, 1923, just passed, there were in excess of ten thousand (10,000) head of buffalo in the United States and Canada.

The original score, some twenty years ago, was exactly 34 wild buffalo beside several hundred which ranged as a separate herd in the muskeg swamps of Canada near the Great Slave Lake; also several hundred tame bison on the various ranches and in parks.

The first real census of tame and wild bison in 1903 showed a total of 1753 head which in the year 1920 had increased to 8473 head and today the total is well over 10,000 animals.

The United States government has several fine herds, those of Yellowstone Park and Wichita, Kansas, being the largest and best. The Yellowstone herd has 100 wild and 500 tame bison, a total of 600 being the latest report. Of the grand total of 10,000 head, the Canadian government has about 6000 and the United States and private herds the remaining 4000 buffalo.

The Canadians are now starting to market their surplus by the sale of buffalo robes, the meat, and stuffed or mounted heads. They sent ten mounted heads to the last annual "Fur-sale" at St. Louis, where they sold for from \$350 to \$1,250 each.

*Reindeer*—The most remarkable conservation and increase of animal life has been that of the reindeer in Alaska. In 1892, just 30 years ago, Dr. Sheldon Jackson brought over the first installment from European Russia, which was followed by the United States government shipments from Siberia. A total of some 1280 animals was imported during the ten years from 1892 to 1902. The increases since that time have been phenomenal as up to January, 1922, a census shows nearly 250,000 animals distributed as follows:

|                        |         |
|------------------------|---------|
| Natives .....          | 162,000 |
| Government herds ..... | 12,000  |
| Mission herds .....    | 24,000  |
| Others .....           | 52,000  |
| Total .....            | 250,000 |

Reindeer meat is now on sale in most of the large cities in the states but does not fulfill the demand expected of same. The white man's palate has been so long used to his regular civilized meats, beef, mutton and pork, that reindeer steak or cutlets are considered as a novelty and not as a regular diet. There is some question as to its success as a seller in the United States proper. It is, however, a great boon and really an act of Providence to the Alaskan native, giving him food, and clothing without the former dangers and uncertainties of his former food supply of seal and walrus.



*California Valley Elk*—Before the white man arrived in California our great valleys were teeming with all varieties of game; both mammals and bird life existed in untold numbers. In an effort to keep before us some of these beautiful creatures the California Academy of Sciences with the aid of other agencies has considered the proposition of establishing game refuges in favorable localities.

The first unit has been established in the Yosemite Valley under the control and care of the National Park Service and consists of some thirty acres on the floor of the valley near the Sentinel Hotel alongside of the clear flowing Merced River and just in front of the new Rangers Club House. This is a large fenced enclosure which will be the central unit for the care and propagation of the California valley elk. This paddock will be considered as the parent or base for the breeding and distribution of the species which differs so much from the Roosevelt or mountain elk that they will not inter-breed.



FIG. 7. California valley elk in corral at Buttonwillow, Kern County, ready for shipment, by California Academy of Sciences. Photograph by John Rowley.

The original herd for this paddock came from the Miller and Lux ranch at Buttonwillow, Kern County, where at one time there was a total of 400 head. Several round-ups or rodeos have taken place and the actual count made September, 1921, showed nearer 350 head to be correct. Four catches have been made:

|                                           |            |
|-------------------------------------------|------------|
| About 1910 Biological Survey .....        | 10 animals |
| 1914 California Academy of Sciences ..... | 54 animals |
| 1915 California Academy of Sciences ..... | 92 animals |
| 1921 California Academy of Sciences ..... | 10 animals |
| Total .....                               | 166        |

The above animals which were caught up and distributed have about held their own. The natural increase has about offset the losses.

The herd in the Yosemite will be kept as a base which can be fostered and cared for so this most interesting variety of the American elk, which all sportsmen and collectors call "The king of the Cervidae," will always remain with us.

## THE BLACK BEAR IN RELATION TO STOCK.

By JAY BRUCE, State Lion Hunter.

An effort is being made by the stockmen of California to repeal the law protecting the black bear (*Ursus americanus*). The complaint against the bear is based on the allegation that he is destructive to stock.

I have no doubt that most of these men sincerely believe that the bear does kill stock, but I am convinced by my own experience that these men are being misled by appearance and misinformation.

I myself have hunted since I was 10 years old and have traveled on foot more than 30,000 miles over the mountains of California, hunting and trailing different kinds of game. About 1500 miles of the distance has been covered while hunting mountain lions. For several years before I was employed to hunt lions for the California Fish and Game Commission, I made a business of conducting deer hunting and fishing parties during the open season, and hunting bear, lion and bobcats during the fall and winter. At that time I found the average bear to be worth about \$50, including meat, hide and the lard, which was used by my family. The same bear, if killed during the summer, would not be worth anything for any purpose.

During my many years of sportsmanship I have bagged 42 bear, 155 mountain lion, and 200 bobcats. When I entered the employ of the Fish and Game Commission on January 1, 1919, I immediately began breaking my dog from running bear, and specialized on hunting lions. Nearly all of my hunting was done when bear were from five to ten times as numerous as lions and on account of using thoroughly trained lion dogs I have had many unusually favorable opportunities to correctly check up on reports where bear were accused of killing stock. Every such report I have investigated I have found the bear to be innocent of the killing. However, I can easily realize why the average stock man gains the impression that the bear kills his stock, for while hunting bear and lion I have found hundreds of carcasses of deer and domestic stock that were killed by mountain lion and eaten by bears. The lion seeks out the bedding grounds of sheep during the night and slays several sheep in a few minutes, or he lies in the brush on the range and kills sheep during the day, in either case eating only the liver and part of the hams, leaving the balance to decay. The bear, which is a natural scavenger, is attracted to the range by the odor of the decaying carcasses and stays there, living on the kills left by the lion. The sheep destroy the lion tracks on the range, so when, on account of the odor, the herder finds the sheep carcass, the bear has already been there and trampled the ground around the kills. Then the bear is accused of making the kills.

One example of the kind was last October, while on my way into Big Squaw Creek in Shasta County, when I met a sheep man from Dunsmuir, who was driving his sheep out of the mountains for the winter. When I asked this man if his sheep had been bothered by lion during the summer, he answered that they had not, but that he had lost about a hundred sheep by bears. When I suggested that the sheep had probably been killed by lions, he very emphatically stated that they had not, as there had not been any lion or lion signs on his range at any time during the summer, but that bear signs were numer-



ous. He said, "I know it was bear's work for I know the work of bears and could not be mistaken." On the strength of this information, I immediately went onto this man's sheep range which he had just left, and bagged ten lions during nine days of hunting, and about the same time a man by the name of Morgan bagged five lions just off the western edge of the same range. Every one of these fifteen lions could have been living on sheep all summer and probably were doing so, at least part of the time.

Another example of this kind was the case of Charles Ralph, who was raising goats in Tuolumne County. Ralph had lost 300 goats one year, and he told me that there were five lions and several bears killing his goats. I bagged one large male lion on the first day, and found the lion's stomach contained goat meat. Saw signs of several bears on the range but found no more lion signs during five days of hunting. A year and a half later, Ralph wrote to me, stating that he had not lost any more goats nor seen any more lion signs. After the lion was killed, the goats were not molested. This one lion had apparently destroyed 300 goats in one year, and several bear had been living on the kills after they were abandoned by the lion. Naturally the bear was blamed for part of the damage.

While I was hunting lions in El Dorado County last August, in company with Mr. Frank Newbert, we were informed two lions had killed one hundred sheep within twenty-five days, at the head of Alder Creek. Mr. Newbert and I arrived at this range about two days after the sheep had been moved out, but a cattle man by the name of Johnson took us to where one lion had killed a sheep about three days before. We could plainly see by the tracks that the lion had killed the sheep and dragged it for about a half mile and hidden it in a thicket of fir saplings. We found the remains of several sheep near this thicket and all of them had been devoured by bears, only the hide and bones remaining. We trailed this lion, which was a very large male, for about a mile and then found the fresh track of a lioness, which we followed until two o'clock in the afternoon when we found where the carcass of a sheep had been dragged across a flat; we then followed the drag for about two hundred feet and found the kill in a thicket of fir trees. This sheep had apparently been killed about nine o'clock the evening before and two bears had already found the carcass, devoured part of it and then bedded down near by, leaving only when they heard the hound baying on the lion trail. The bears had destroyed the lion tracks and scent around the carcass, and it was necessary to circle at a distance of a hundred feet to again find the lion tracks, which we followed unsuccessfully until dark. Early the next morning we returned to the kill in order to get her fresh tracks, if the lioness had returned to the kill. The lioness had not returned but two bears had been there and devoured the remains of the sheep. I called Mr. Newbert's attention to the fact that all the evidence around the kill had indicated that the bear had killed the sheep. We then back-tracked the drag for about three hundred feet to the place where the sheep was killed. Then we could plainly see the tracks made by the lioness when she rushed over and struck down the sheep, thus proving the lioness the slayer. This lioness had apparently killed this strong sheep about 9 o'clock in the evening, dragged it to cover, taken a feed, and then left the place with no intention of returning for another feed,

for I tracked her for three days and killed her twenty-five miles from this place. During the next few days I tracked the male lion around his beat, which at one place was twenty-five miles from the sheep range. When I killed him he had almost reached the sheep range again.

A lion travels a definite beat over about one hundred square miles, usually making his rounds every four or five days; when the summer sheep range or run in its beat at any place, the lion may kill several sheep within a few minutes some time during the night, take one feed and then continue on around his beat, make a kill or two at some other point and not return to the range for several days; in the meantime, the bear is attracted to the range, where he stays, living on the sheep carcass left by the lion. Fresh bear signs are seen every day on the range and around the carcass and it is not surprising that the bear is blamed for the damage done by the lion.

In every instance that I have personally investigated where bear have been accused of killing stock, I have found the slayer to be a lion, except in a few cases where coyotes were responsible. In fact, I have never known a bear to actually kill any large animal, either wild or domestic.

The mountain lion is a strictly carnivorous animal and in his natural state demands meat freshly killed by himself. In the summer a carcass will quickly taint and in winter it will freeze; for these reasons the lion will make a fresh kill for his feed wherever possible. On the other hand, the black bear is not by nature a killer for he does not need to depend on this method for a living. While he will travel a long way to eat putrid meat, still he can get plenty without it. His food list is a long one, consisting of acorns, fruit, berries, mint, ants, yellow jackets, roots, grass and wild clover, all of which I have personally known wild bear to eat.

In my opinion the black bear is a splendid game animal, valuable for meat, lard and fur when killed in the fall or winter. I do not believe that he can be considered a menace to stock or game, but that he has been wrongly accused on general appearance for the damage done by mountain lions and coyotes, and that the complaints largely made by people who had no reliable method of investigating the circumstances, or had neglected to do so, assuming that bear signs around the carcass of stock were conclusive evidence that the bear were responsible for the loss of the stock.



## SALMON FISHCULTURAL OPERATIONS ON THE KLAMATH RIVER.

By HAROLD C. BRYANT.

Most of the salmon cultural operations of the California Fish and Game Commission are now centered on the Klamath River, the only remaining stream with a good run of salmon. It may also be explained that this same river furnishes most of the trout eggs utilized at the hatcheries, there being four egg-collecting stations on tributaries of this stream. Change from the Sacramento to the Klamath River has been necessitated because of the poor take of eggs in recent years at the United States Bureau of Fisheries' egg-collecting stations at Mill Creek and Baird, and because of a growing desire of the state to be independent of government aid. A depleted run of salmon, plus the barrier formed by the Redding Dam, have apparently been responsible for the decreasing supply of eggs on the Sacramento.



FIG. 8. Klamathon salmon spawning station. Photograph by A. S. Cheney.

Until 1918, the Commission depended almost wholly upon the United States Bureau of Fisheries for its supply of salmon eggs. This arrangement was satisfactory for many years, as an abundant supply of eggs was available from the Sacramento River stations. Fifteen to twenty millions of eggs were donated by the bureau annually. Relations have been most cordial, the federal and state bureaus working in complete harmony. Nevertheless, the Commission desiring to be wholly independent, beginning in 1918, took over the former Bureau of Fisheries' egg-collecting station at Klamathon, Siskiyou County, and since that time this station has supplied most of the eggs utilized by the state. Splendid results were to be expected for spawning operations at this point for many years previous had demonstrated the suitability of the location.

In accordance with the provisions of the law, which requires owners of dams to erect hatcheries in lieu of fishways, when dams are too high for the successful operation of a fishway, the California-Oregon Power Company, owners of the Copco dam, were required to build and equip a hatchery at Fall Creek, and to build racks and an egg-collecting station for salmon at Klamathon. This equipment cost the company about \$20,000. This spawn-taking station and hatchery now form the nucleus for most of the salmon cultural operations. The racks are well built and the resulting take of salmon is very satisfactory.

The station is operated during late September and October, a crew of five or six men being necessary. Salmon are seined from the river between the racks and are placed in holding tanks pending spawning



FIG. 9. Seining for salmon at the Klamathon spawning station, November 13, 1922. Photograph by A. S. Cheney.

operations. In spawning trout the eggs are stripped from the female and the fish is returned to the stream, but in spawning salmon, the fish is first killed and then cut open and the eggs secured. This is possible in that the fish habitually die after spawning. Being still useful for food, the spawned salmon are given to residents, who are glad to smoke or cure them. In some states these spawned salmon are dried and utilized as fish food at the state hatcheries.

Investigations by the Commission have shown the average yield of the Klamath River king salmon to be 3891 eggs, the larger fish furnishing five to eight thousand eggs, and the smaller ones two to five thousand eggs. The yield of eggs in the Sacramento salmon appears to be greater. To secure the twenty millions of salmon eggs taken during the 1922 season, it was therefore necessary to catch over 5200 ripe



female salmon and as many males. Since many fish reaching the racks are not ready to spawn the number needed for a successful spawning season is very much greater. Many silver salmon are caught in the traps but it is the larger king salmon that is selected.



FIG. 10. King salmon taken at the Klamathon egg-collecting station, November 13, 1922. Photograph by H. C. Bryant.



FIG. 11. Rearing ponds at the Mt. Shasta Hatchery. Photograph by H. C. Bryant.

Large numbers of Klamath River trout are trapped along with the salmon and these are netted from the traps and allowed to continue their way up stream. Doubtless some of these same fish are spawned the following spring at Fall Creek, Bogus and Camp Creek egg-collecting stations.

The salmon eggs are immediately shipped in cans to the Mount Shasta Hatchery or to the Fall Creek Hatchery. Later, some eggs are shipped to the Fort Seward Hatchery. Two of the largest hatching houses are devoted to salmon culture at Sisson. Here the eggs are hatched and the fry held in rearing ponds. After the fry reach the fingerling stage and fall freshets come, the rearing ponds are opened and the fish allowed to enter the Klamath River, in the case of Fall Creek Hatchery, and the Sacramento River in the case of the Mount Shasta Hatchery. This simple method of planting is coming to be recognized as the best method possible.

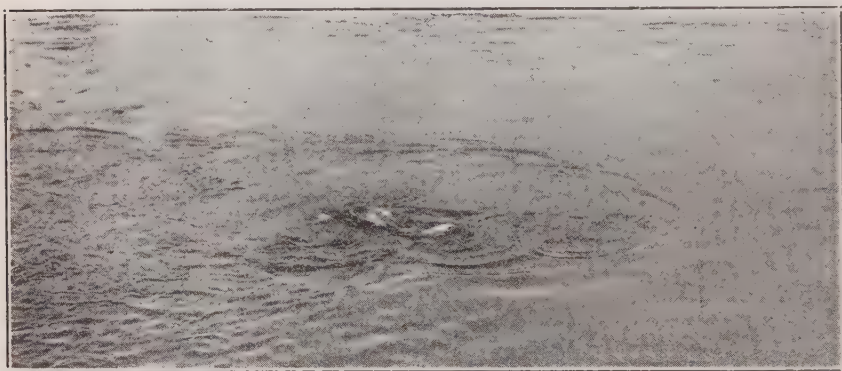


FIG. 12. King salmon spawning on a gravel bar in the Klamath River.

Beginning in 1914, the pond system for rearing salmon to the fingerling stage was instituted in order that larger, stronger fish might be liberated. This method of handling salmon fry gives them a chance to reach the ocean without falling prey to the predatory fishes in the lower reaches of the rivers because of their better development. Two small lakes near the Mount Shasta Hatchery are rented and used as rearing ponds. Equipment now allows the holding of 20,000,000 salmon fry in nursery ponds and lakes until cold weather in the fall, when a draining of the ponds and lakes allows them to enter naturally and without any shock, their native stream. Before being removed to nursery ponds the fry are held and fed in troughs about two months. In the ponds the fry attain a remarkable growth, sometimes reaching six or eight inches in length and usually averaging four to five inches.

The California Fish and Game Commission may justly lay claim to part of the honor of giving to the world the main facts regarding the life history and habits of the king salmon, for Cloudsley Rutter, while working for the Commission in cooperation with the Bureau of Fisheries, worked out and published the first complete account of the natural history of the quinnat or king salmon (U. S. Bureau Fisheries, Bull. 22, pp. 65-141). Now the commission is winning new honors as



the result of marking experiments under the direction of Professor J. O. Snyder, of Stanford University. During the trapping operations in October, 1922, several of the fish that were marked four years ago were taken. The study of these salmon furnishes important evidence as to the age, rate of growth and distribution. The opportunity offered as a result of the trapping operations was thus properly utilized.

It is to be hoped that this increasing knowledge of the life history and habits may be instrumental in helping to solve the numerous problems confronting salmon conservationists. The present situation is such that many take the pessimistic view that salmon must eventually disappear, owing to the numerous power projects which obstruct the upstream migrations.

From a fishcultural standpoint, the situation is favorable, for hatchery problems are largely solved, but there remains the more critical one of barriers to natural increase.

## CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

MARCH 12, 1923.

"To maintain the game supply, and at the same time to provide, if possible, fair sport for the increasing number of hunters that may confidently be expected, is one task before us."—Edward A. Goldman.

### A NEW COMMISSIONER.

Announcement was made on December 12th of the appointment by Governor Wm. D. Stephens of Geo. H. Anderson as fish and game commissioner to succeed E. L. Bosqui.

Mr. Anderson is a business man of San Jose who has long been interested in fish and game conservation. When state senator, in 1901, he fathered bills for the nonsale of game. He is an ardent sportsman and angler and noted as a trap shooter.

Mr. Anderson's statement to the press follows:

Having been asked by numerous sportsmen what policy I would pursue on my entrance to the Fish and Game Commission, I want to say that I heartily indorse the policy of the present Commission as to game protection and propagation of fish, and feel that it has made a wonderful record.

I am for laws that will benefit the largest number of sportsmen and protect the game. I am also in favor of the present Federal tax bill, which has already passed the United States Senate. The Federal Government has done an immense amount of good in the protection of our wild ducks, especially in the Alaska region, and will need money to further pursue the good work it has started.

I believe in the nonsale of game, and claim that more people are now enjoying



Geo. H. Anderson, newly appointed fish and game commissioner.

wild ducks through the courtesy of friends than before the nonsale law went into effect. With the advent of the automobile we have dozens of hunters and fishermen where we had one a few years ago, and it is up to the Commission to raise and distribute fish and protect the game to the fullest extent.

In this respect will say that the present Commission has made wonderful strides, and in entering this Commission I am joining two of the most enthusiastic and thorough sportsmen in California (Messrs. Newbert and Connell). Besides being competent, they are thoroughly honest in spending the money of the sportsmen of the state, and I hope I will be able to make as fine a record as these gentlemen have. I will surely try my best.

Permit me to thank my numerous friends for a large number of congratulatory letters and telegrams on my appointment.



## 1922 BIENNIAL REPORT.

The biennial report of the Fish and Game Commission will soon be available to those interested. It chronicles the outstanding features of the work during the past two fiscal years, and calls attention to many problems needing solution.

Arrests for violations of the game laws totaled 1221. Of this number 1108 resulted in convictions. The fines collected amounted to \$33,998.80, in addition to 1289 days of imprisonment awarded. Arrests for violations of state fish laws totaled 1037, from which there were 983 convictions. Fines collected amounted to \$29,028.50 and offenders were awarded a total of 994 days of imprisonment. The total number of arrests amounted to 2258, nearly 400 more than reported in 1920.

During the biennium a large amount of illegally taken fish and game was seized. The totals are of interest: Over two tons of deer meat; 4500 ducks and 500 quail; 25 tons of fish, and about 12 tons of lobsters and shellfish. All wholesome fish and game was donated to public and charitable institutions and many grateful letters of acknowledgment have been received. Considerable illegally used fishing apparatus, which was seized after being condemned in superior court, has been destroyed or sold by the board in accordance with law.

The total output of trout amounted to 40,974,000 and of salmon fry 18,037,000. The pond system established at the Mount Shasta Hatchery now furnishes an annual take of 10,000,000 eggs. Not only is this supply of eggs more dependable but the expense of securing them is much less. The fishcultural department's recommendations include enlargement of the pond system, the building of more hatcheries, the introduction of certain insect food for fishes, the establishment of a fish reserve on the Klamath River, and certain changes in the laws relating to game fish.

The Commercial Fisheries Department reports on interesting salmon marking experiments carried on to determine the age, rate of growth and distribution of the king salmon and on the fisheries investigations undertaken by the State Fisheries Laboratory.

Educational work has included lectures in the public schools, the issuance of many bulletins, and the development of instruction in natural history in the summer resorts.

Under the head of current problems such subjects as the following are discussed: the alien hunter, power dams endanger salmon run, demand for trout

fry exceeds supply, grazing endangers feed conditions in game refuges, winter feeding of game, and careless hunters.

Reports of the district officers are given and the appendix contains statistical reports showing that 225,000 hunting licenses and 186,000 angling licenses are issued annually; that the fisheries of the state annually supply 20,500 tons of fish, and that 256 bounties were paid on mountain lions during 1921.

The report brings convincing evidence of the great value of the state's game resources and the extent of the conservation measures taken to conserve them.

## WESTERN ASSOCIATION OF FISH AND GAME COMMISSIONERS MEETS AT SACRAMENTO.

The second annual meeting of the Western Association of Fish and Game Commissioners was held at Sacramento, December 4 and 5, 1922. President D. H. Madsen of Utah presided, and the following members were present: Hon. Chas. A. Jakways, Montana; Hon. O. M. Jones, Idaho; Hon. R. G. Parvin, Colorado; Hon. L. E. Bean, Oregon; and Hon. F. M. Newbert, California. Geo. A. Lawyer, United States Game Warden, two representatives of the United States Forest Service, one of the National Park Service and others interested were in attendance.

The first day was devoted to a discussion of methods of fishculture. The use of nursery ponds to care for the fry when first planted in the mountain streams was discussed at length, as was also the destructiveness to young trout by the great blue heron, merganser, pelican and grebe. The consensus of opinion was to the effect that these birds are so destructive to young trout that they should be removed from the protected list and means taken to reduce their numbers. It was decided that in fish propagation one fish three inches long is equal to fifty small fry planted in the stream, because of its greater ability to escape enemies. Attention was called to the poor success obtained by purchasing eastern brook trout eggs from private hatcheries since most of the eggs come from two-year-old fish and the embryos are weak. Time was also given to a discussion of the screening of irrigation ditches and of the construction of fishways. Heads of departments of the California Commission gave reports on their work.

A heated discussion on the Public Shooting Grounds-Game Refuge Bill then took place. A majority of the members expressed themselves as against further encroachment of the government in

the administration of fish and game. Mr. Geo. A. Lawyer, United States Game Warden, and Hon. F. M. Newbert, president of the California Fish and Game Commission, defended the measure. Two important points made by the opposition were the duplication of the warden work in that federal wardens will be able to make cases with reference to migratory birds only, and the difficulty to be expected in collecting a dollar license in those states where the license fees have already been raised to two and three dollars.

At the closing session the following resolutions having received the endorsement of the resolutions committee were passed unanimously by the association, with the following exception: A minority report on the proposed "Public Shooting Ground and Game Refuge Bill" was filed by the resolutions committee, and upon vote by the association the states of Oregon, Utah, Idaho and Colorado voted for the adoption of the majority report, and the states of California and Montana voted in favor of the adoption of the minority report. The majority report of the resolutions committee, having received a majority vote of all the delegates present, was declared adopted. Both the majority and minority reports were spread on the minutes of the association as follows:

#### Majority Report.

*To the officers and members of the  
Western Association of Game  
Commissioners:*

GENTLEMEN:

We, your Committee on Resolutions, to whom was referred the matter of the proposed "Public Shooting Ground and Game Refuge Bill," designated as H. R. 5823 and S. B. 1452, beg leave to report that we have had this matter under careful consideration, and after weighing all of the arguments presented for and against said measures, submit the following resolution as expressing the views of the western states thereon:

*Resolved*, That the Western Association of State Game Commissioners at its regular annual conference, assembled at Sacramento, California, on this fifth day of December, 1922, do hereby reaffirm the action of our association as expressed in resolutions adopted at our annual conference held at Salt Lake City, Utah, on the sixteenth and seventeenth days of January, 1922, and, be it further

*Resolved*, That we are unalterably opposed to the measures referred to, and assign the further reasons for our actions, to wit:

First—There is no crying need for either public shooting grounds or bird refuges in the northwest, nor is such a need apt to become acute for the next ten years. It is the contention of these states that when a condition does arise that needs supervision, that they are capable of taking care of any such situations within themselves. Consequently any im-

mediate service that might result from such a measure would be directed to the districts demanding that service to relieve conditions already existing. These districts are the eastern states.

Second—Already the west is tired of being dictated to as to its operations and its control of natural resources by Fifth avenue, New York, and Pennsylvania avenue, Washington, D. C. The constituents of the game departments of the northwest will hold their respective representatives assembled here to a strict accounting of what they do or recommend at this time in reference to this bill. A large percentage of these people do not know there is such a bill before Congress today, and if they did know the provisions of this bill, particularly that provision demanding an additional license, there would be a general uprising of protest against this measure.

And, further, That this class of legislation is not only not for the best interests of the several states, but is contrary to and clearly a violation of the sovereign rights of the states.

L. E. BEAN.  
OTTO M. JONES.

#### Minority Report.

*To the officers and members of the  
Western Association of Game  
Commissioners:*

GENTLEMEN:

As a member of the committee of resolutions of the Western Association of State Game Commissioners, I offer for consideration the following minority resolution:

WHEREAS, There is before the National Congress a measure known as the "Public Shooting Ground and Game Refuge Bill," which is herein designated as H. R. 5823; and

WHEREAS, The Association of Western States Game Commissioners in session at Salt Lake City, Utah, January 16 and 17, 1922, passed resolutions objecting to the passage of said H. R. 5823 for the reason that in the opinion of the Commissioners there present, the bill as then proposed would have curtailed the jurisdiction of the various states over their local wild life; and

WHEREAS, Certain amendments have been introduced by Congressman Anthony as follows:

Amendment to H. R. 5823 (Original Bill).

On page 7, line 9, strike out "fish, wild animal, or" and insert "migratory."

On page 7, lines 21 and 22, strike out "fish, wild animal, or wild," and insert in lieu thereof "migratory."

#### Amendment to Section 3.

Provided that nothing in this act shall be construed to exempt any person from complying with the provisions of the laws of the several states.

#### Amendment to Section 13.

(Agreed upon to placate fish interests) or except for the purpose of fishing, in conformity with the laws of the state wherein the public shooting ground or bird or game refuge so entered may be located, when conducted at such times and in such manner as will not interfere with the maintenance of such areas as migratory bird breeding grounds.

Amendment to Section 4.

(As originally written, to be submitted by Congressman Anthony on the floor of the House for section 4 as amended by the House Committee.)

Provided, That any part of the 45 per centum last mentioned or of the 10 per centum of such moneys received in any fiscal year and remaining unexpended and against which there are no liabilities at the expiration of two years from the end of such fiscal year, shall revert to the surplus fund of the treasury. The Secretary of Agriculture shall make an annual report to Congress of receipts and expenditures under this act.

Section 17.

That if any clause, sentence, paragraph or part of this act shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, or part thereof directly involved in the controversy in which such judgment shall have been rendered. And

WHEREAS, The Association of Western States Game Commissioners in session assembled at Sacramento, California, this fifth day of December, 1922, believe the fundamental principal of H. R. 5823 to be good; therefore, be it

*Resolved*, That when the aforesaid amendments have been passed and made a part of H. R. 5823, we approve and urge the immediate passage of the measure; and, further be it

*Resolved*, That we reserve our commendation of any other amendments or changes in H. R. 5823 until said changes can be considered by our association, and

It is ordered that a copy of these resolutions be furnished our several representatives and senators in congress, and that the same be spread upon the minutes of this meeting.

C. A. JAKWAYS.

Done at Sacramento this fifth day of December, 1922.

Resolutions.

WHEREAS, The Association of Western States Game Commissioners in second annual convention assembled at Sacramento, California, December 4 and 5, 1922, has received every evidence of the highly efficient manner our present hosts, the California Fish and Game Commission, has administered the laws for the conservation of fish and game in California, and has enjoyed to the limit the typically southern hospitality for which the "Golden State" is famous; now, therefore, be it

*Resolved*, That this association tender to Mr. Frank M. Newbert, president of the California Fish and Game Commission, and his associates, our hearty personal appreciation of the innumerable pleasant courtesies we have enjoyed at their hands, and our official recognition of the splendid precedents established and examples set in wild life work in California which might well be emulated by other states.

WHEREAS, It has been found that certain migratory birds are of no economic value in some states and are predatory in

those states and whereas these same birds are beneficial in other states; therefore, be it

*Resolved*, That we believe the destruction or protection of these birds be worked out between the several states and The Bureau of the Biological Survey.

WHEREAS, It has come to our notice that game, fur-bearing animals, and fish taken in violation of the laws of one state are transported to a sister state and there confiscated by that state's authorities and in some cases sold by that state's officers and the money retained by them;

*Resolved*, That we favor a uniform law requiring the state authorities who confiscate such game, fur-bearing animals or fish, to return the confiscated property aforementioned to the authorities of the state where the same was unlawfully taken, or in case of perishable property, to sell the same and remit the net proceeds to the fish and game authorities of the state where the violations occurred.

WHEREAS, It appears that continued absolute protection for deer within the Grand Canyon National Game Preserve has resulted in a condition of overstocking, which, if continued, will be dangerous for the deer; and

WHEREAS, Such overstocking must eventually result in economic loss and might defeat the objects of the game preserve; and

WHEREAS, The great abundance of deer in the vicinity of the Grand Canyon National Game Preserve where they may be easily observed is of great interest and value; therefore, be it

*Resolved*, That the Department of Agriculture and the State of Arizona cooperate in placing into effect such a plan of limited utilization of deer within the Grand Canyon National Game Preserve as will prevent overstocking, assist in obtaining a drift of deer to outside ranges and at the same time maintain an abundant supply of such game.

Election of officers resulted in Chas. A. Jakways, Montana, being elected president; Frank M. Newbert, California, vice president; the secretary to be chosen by the newly elected president.

The next meeting will be held at Gardner, Montana, next October, in order that the delegates may have a chance to visit Yellowstone National Park and be present at a buffalo drive to be staged for their benefit.

PROPOSED LEGISLATION.

The Fish and Game Commission, after careful investigation, believes that the following changes in the fish and game laws should be made by the legislature in order to properly conserve the species concerned:

1. The bag limit on deer to be reduced to one buck with branched antlers. Those who secure hunting licenses now number more than 225,000, which is 75,000 more than the present standing army of the United States. This in-



creased number of hunters, together with the ease with which hunting grounds are reached, and the increased efficiency of firearms, makes it important that the annual toll be reduced. A one buck bag limit will also make law enforcement easier.

2. The status of the salmon makes it imperative that all netting of this fish in freshwater streams be prohibited. The marked depletion of the salmon run has conclusively proved that recommendations to past sessions of the legislature relative to netting in freshwater were entirely justified and the perpetuation of this valued food fish is dependent upon increased protection of this sort. Additional legislation is necessary to conserve the salmon run on the Klamath River, which furnishes the only satisfactory supply of salmon eggs for use of the hatcheries.

3. The demand for an increased angling license to furnish funds for a larger output of trout fry should receive favorable action by the legislature. In 1911 applications for trout fry to the amount of 7,000,000 were made. This past year the demand was for 70,000,000 of trout fry, an amount far in excess of the present hatchery output. It must be conceded that a greater hatchery output is needed to keep the streams of the state stocked, and the only possible way in which this can be increased is by making funds available for enlarging the work. Since the increase is demanded by the anglers themselves, thus making the burden fall on those who will most profit, and not upon the taxpayer, no difficulty should be experienced in passing the necessary legislation.

#### FISH FOOD NEEDED IN MOUNTAIN LAKES.

It is coming to be definitely known that there are many mountain lakes which have been stocked with trout that support but a small number of fish because of the lack of sufficient food supply. Undoubtedly some lakes are quickly depleted of their fish because no suitable spawning grounds are available, but in other instances the one condition lacking is that of better food supply. The Commission has already tried out some experiments in transplanting insects and crustaceans, but recent successes in eastern states makes it apparent that the stocking of such lakes with some small fish would greatly improve conditions.

A lake on the E. H. Harriman estate, within forty miles of New York City,

was stocked with 3,500,000 smelt fry in 1919, as a preliminary step toward establishing a food balance. In the same year steelhead trout and land locked salmon were planted. Two years later fish weighing from 2½ to 4½ pounds were taken. In that each fish caught was gorged with smelt, their rapid growth and splendid condition was attributed to this introduced food supply. Certainly such experiments mean much to the future of angling everywhere. Since the history of plants is available for many mountain lakes, there is a splendid opportunity to try out this method of improving angling.

#### SUMMER RESORT EDUCATIONAL WORK A SUCCESS.

The summer resort educational work of the Fish and Game Commission now carried on, as a cooperative scheme with the National Park Service in Yosemite National Park, is attracting more and more attention from summer vacationists. Each year more people plan their summer vacations so as to take advantage of the nature guide service offered in Yosemite. During the 1922 season nature guides lectured to 39,500 persons. Most of the lectures were illustrated with either lantern slides or motion pictures, and all of them either dealt directly with the life and habits of some living thing of the Park or with the conservation of natural resources.

An outstanding feature of the work is the field trips offered twice daily, when people are given a chance to obtain first hand information regarding the living things of the park. Special field trips are offered for children. On Saturdays, an all day trip to the rim of the Valley gives opportunity for study of the change of fauna and flora from an elevation of 3000 feet to an elevation of 7000 feet. On these long trips a fine chance to study deer, grouse and mountain quail is afforded. The attendance on these field trips during the summer months amounted to 3039. During the office hours, thousands of questions relative to fish and game were answered.

The Yosemite nature guide service has really been an experiment in popularizing natural history in the national parks. Its spread to Yellowstone, Glacier and Sequoia national parks, and the plan to organize it as part of the educational program of the National Park Service shows that it has filled a real need. It is gratifying to find that the California Fish and Game Commission was instrumental in starting so important an educational feature in the summer resorts of the country.

## BIRD BANDING.

Few projects concerned with bird study have had so notable a boom as has bird banding. Renewed interest in this subject in America is traceable to a report of bird banding activities made by Mr. S. P. Baldwin at a meeting of the American Ornithologist's Union a few years ago. Mr. Baldwin demonstrated so clearly that many important facts regarding distribution, migration and habits could be obtained from systematic bird banding that even the government took up the matter. Now the cooperators enlisted by the government number 490 and several bird banding associations have sprung up in various localities. During the past year six thousand birds were banded and much valuable information was recorded as a result of the 2500 "returns" and "repeats" secured.

It will be remembered that not less than eight ducks banded by the United States Biological Survey at Bear River, Utah, were taken in California previous to 1920. The banding of waterfowl at Lake Scugog, Ontario, Canada, in 1920, obtained remarkable results. Within the two years following thirty-five of the 250 ducks, or about 16 per cent of them, were killed and the bands recovered. Mallards and black ducks were secured as far away as Florida and Louisiana, and a blue-winged teal was taken at Port-of-Spain, Trinidad, British West Indies.

Sportsmen of California glibly talk of a northern flight of birds and make speculations as to where these birds were reared. However, no actual evidence, other than that of Utah birds, has yet been obtained. This is the more remarkable when it is known that there are many places where successful banding operations could readily be carried on. One such place is Lake Merritt, Oakland, where thousands of pintails and baldpates gather every winter. Without injury to the birds, many could be trapped and successfully banded. Although, because of closed season to the north during the breeding season, few returns might be secured, yet the mooted point as to whether the same birds return year after year could readily be ascertained. Someone should collaborate with the government bird banding department and take up work at Lake Merritt.

## THE OPEN SEASON ON DEER.

Forest supervisors are requesting a later open season on deer as a means of lessening the number of forest fires. They contend that a large number of the fires in early fall are attributable to hunters, as can be seen by a report made to the Fish and Game Commission, a summary of which is published on another page. Fortunately the demand is for the latest open season consistent with the breeding habits of deer.

If hunters can be singled out among the many recreationists in the mountains during August and September as being responsible for fires it would seem reasonable to attack the problem in this manner. But this line of attack may defeat the very end in view for the putting over of the hunting season a whole month in the Sierra with the reduction of the open season to thirty days is very likely to cause such a concentration of hunting parties within the national forests that the fire risk will be greatly increased rather than decreased. Could the hunting season be logically placed in rainy months, it would be a different matter. Reduction of the bag limit to one buck, with perhaps total protection for mule deer, seems reasonable in view of proper conservation, but the demand for a much later and shortened season is one that has a direct bearing on the widely different conditions existent in the state and on the logical time for the securing of deer to be used for food.

The most necessary thing is that the deer season be consistent from the standpoint of deer conservation, with a second look toward the matter of fire prevention, for it appears to us that the hunter is but one of the many factors which contribute to fire loss.

The Forest Service is to be commended for its untiring efforts to lessen the loss due to forest fires and the hunters and fishermen of the state will be ready to accede to any reasonable measures to prevent forest fires. The question to be decided by the legislature is whether the advocated late and shorter open season on deer is consistent with the principles of game conservation, and whether the open season requested is the best means of attaining the results sought by the Forest Service.

### NEW EDUCATIONAL FILMS.

The educational department of the Commission announces a new film entitled "The Salmon, King of Fishes." This film actually shows salmon spawning in the Klamath River and details the salmon-cultural work of the Commission. Scenes show the seining of salmon, spawning operations, shipment of eggs, etc.

Other new motion pictures include ducks and geese on their loafing grounds near Marysville Buttes. Some wonderful pictures showing the large numbers of waterfowl which still winter within the great valleys of California were recently taken.

These films may be obtained by schools, fish and game protective associations and other organizations.

The following announcement from the Weekly News Letter of the State Department of Agriculture for October 7, 1922, should be of general interest and should make certain individuals "prick up their ears."

### Predatory Animal Force Renders Service in Lassen.

"During the month of August six traps, belonging to the Government and used by Hunter Frank W. Koehler in State-County-Federal cooperative work in Lassen County, were stolen. A Basque sheep herder, the guilty party, was seen taking the traps by Hunter Koehler. The matter was reported to Inspector Poole, of the cooperative predatory animal control service, conducted by the California Department of Agriculture



FIG. 13. Geese near Pennington, Sutter County, November 17, 1922. Geese are still numerous in some parts of California. Photograph by H. C. Bryant.

### FINE OF \$100 AND SIX MONTHS IN JAIL FOR STEALING TRAPS.

Section 13 of the Fur Trapping Regulations of the California Fish and Game Laws states: "Every person who shall disturb or remove the traps of any licensed trapper while trapping on the public domain or on lands where he has permission to trap is guilty of a misdemeanor." In spite of this warning the reports of California trappers show that many traps are stolen annually. In some instances only the animal in the trap is taken, while in other cases both the animal and the trap are stolen. The following experiences are typical. Mr. John N. Beck of Napa, reports a catch of 90 coyotes during the season of 1921-22. During that trapping season he had 30 traps stolen. In 1920, the writer found that certain woodchoppers were regularly stealing coyotes from the traps of Arthur Oliver near Firebaugh.

and the U. S. Department of Agriculture, who made a trip to Ravendale to investigate and take such action as appeared to be logical. A complaint was sworn to and the man arrested, tried and convicted under the state law applying to such cases. A sentence of \$100 fine and six months in jail was imposed by Judge M. R. Arnold of Susanville, together with a strong talk along the lines of refraining from such acts, since the various agencies are endeavoring to assist the stockmen in diminishing their losses of stock by eradicating the coyote. He stated that overt acts such as this not only retards the work of the men employed as hunters but is a menace to the general welfare of the community.

"It is believed that this will have a salutary effect and will be an object lesson that will prevent the theft of traps and animals such as have occurred in the past."—Joseph Dixon, Berkeley, Cal.



### WHALES DISAPPEARING ALONG CALIFORNIA COAST.

A bulletin just issued by the State Fish and Game Commission entitled "A History of California Shore Whaling," by Professor Edwin C. Starks of Stanford University, calls attention to the past and present status of shore whaling along the coast of California and points out the rapid disappearance of the mammals responsible for a valuable industry. Early accounts show that whales were extremely numerous in the early seventies but by 1874 extensive whaling operations had reduced them to the point where shore whaling was much less profitable. At one time seventeen whaling stations were to be found along the coast. Fifteen to twenty years ago whaling was not considered profitable anywhere along the coast of California, but more recently two whaling stations have been established and profitably run.

The bulletin, which is well illustrated, furnishes an interesting outline of the history of whaling along the California Coast and describes each of the species of whales inhabiting California waters. The California gray whale, once most abundant of all, has now almost entirely disappeared. The humpback is the only whale that can still be called common, but it is not nearly so abundant as it was formerly.

Interesting pictures show flutings on the under surface of a humpback whale covered with goose-neck barnacles, which are found in patches on various parts. Apparently, living animals, therefore, are infested as are the bottoms of ships, but not with the same kind of barnacles.

The conservation of whales is very important at this time, and to be adequate must be international in character. At present, no protection whatever is afforded the largest of sea mammals and females are often killed while nursing young.

The bulletin, which is the sixth of the series of fish bulletins, may be obtained on application to the Fish and Game Commission.

### MANY WHALES COMMERCIALY EXTINCT.

According to figures given by Dr. B. W. Evermann in The Scientific Monthly. (Vol. 15, p. 310), the total number of whales taken by the Moss Landing Whaling Station of California from January 16, 1919, to May 3, 1922, was 832. "Seven different species were represented, as follows: Bottlenose, 1; sei, 1; California gray, 1; sperm, 5; sulphur-

bottom, 5; finback, 33; and humpback, 781.

"These figures are of value in that they show the species of whales that now occur on the coast of California and the relative abundance of the different species. It is seen that only one—the humpback—is at all common. The scarcity of the others is significant; indeed, all but the humpback are already commercially extinct. Only the humpback remains in sufficient abundance to justify the establishment of a whale fishery on this coast.

"In 1853 Captain Scammon estimated that fully 30,000 California gray whales visited the California coast annually. The small catch of that species shows clearly that it has been almost wholly exterminated on the California coast. It is evident that the humpback whale also will soon be as seriously depleted unless effective measures be taken soon for its protection."

### FURTHER TESTS IN USE OF GALVANIZED VESSELS IN SHIPPING FISHES.

In connection with the transportation of living fishes in galvanized iron vessels, further experiments along this line have been conducted, the results in each case tending further to prove that galvanizing is not harmful to fish. The recent experiments involve such fish as rainbow trout, brook trout, lake trout, and whitefish fry and fingerlings. Fish were in transit from periods ranging from 6½ to 35½ hours without change of water, and in each case they arrived at destination in good condition.—Service Bull., U. S. Bur. of Fisheries, No. 88, p. 5.

### FOREST FIRES AFFECT FISH LIFE.

So obvious is the serious loss of valuable timber occasioned by the fires which annually devastate our forests, even those who are poorly informed are well aware of this condition. Less apparent but no less real is the loss, from the same cause, of other natural resources. The wild life of the woods and streams must suffer. Particularly through the food and game fishes is there a serious loss. Too little attention has been paid to this subject and consequently we have little reliable information. A few of the most immediate effects detrimental to fish life, following forest fires, are a quick rise in the temperature of the water, a lowering of the oxygen content, a change in the chemical properties, a destruction of shade. Most forest streams are slightly acid—a condition known to be well

adapted to trout; the deposit of ash in the stream gives it an alkaline quality, most destructive to fish life. This deposit of ash also probably has an injurious mechanical effect on the fish, in addition to that incurred by the chemical change. These immediate and more easily recognizable effects of the fires do not cover all the loss that may be expected. More far-reaching is the destruction of food, increased turbidity of the water and the decreased protection from floods and droughts.—Service Bull., U. S. Bur. of Fisheries, No. 88, p. 2.

#### THE WILD PHEASANTS OF CENTRAL CALIFORNIA.

Several years ago there were ten pair of Chinese pheasants liberated close to Antioch. The ten pair soon scattered and the next season they were in different parts of central California. In 1921 I was at Isleton, a small town on the Sacramento River. I was out every day of the season after quail and cottontails. Early in the morning I have seen as many as fifty and sixty pheasants in a flock. They would, as a rule, be seen in the corn fields in the mornings and in the asparagus fields or the brush in the afternoons and evenings. As a rule, the hunters abide by the game laws around there, but I have seen boys around seventeen or eighteen years of age come to town with a barley sack as full of pheasants as they could get it and some in their coats. They would sell them to the Chinamen and restaurants about the towns of Isleton, Rio Vista, Ryde, Walnut Grove, Locke and Courtland.—Chas. Follett, Merced, California.

#### MULE DEER NEED FURTHER PROTECTION.

Big Game Refuge (District One B) is insufficient to maintain a breeding stock of mule deer, since there is not sufficient water during the hunting season. The southwestern portion thereof is entirely without water for deer. The deer leave this refuge to find water and the hunters have learned to wait on the runways and trails and wholesale slaughter results.

The mule deer is the largest and finest game animal in the State of California and it should have all the protection possible. Additional areas are needed to supply sufficient water in the present refuge, and additional areas must be set aside as refuges. The construction of roads for automobiles makes it possible for the hunter to reach every nook and corner of the deer range and only the

strictest laws will make it possible for the mule deer to continue to exist. While this season a great many good specimens of this species were bagged, the writer can verify the fact that the mule deer are at present greatly on the decrease; it is very common to see does without fawn. There is also a certain area known as the Lava Beds consisting of approximately one and a half townships, which is considered by sportsmen a slaughter pen for mule deer. The most inexperienced hunter has been able to bag a limit on this area. On the opening day of the season of 1920, the writer estimated 160 hunters were bombarding the animals. From his own observation, he estimates 100 mule deer were killed in the Lava Beds during the winter of 1921-22. During this winter, coyotes took a large toll of mule deer. The writer has in evidence a wonderful large buck head, which he found with blood flowing from the carcass of the animal, and four large coyotes taking a meal of warm flesh. Two of the coyotes were there shot by the warden. Then the warden called upon the United States Department for assistance in exterminating the coyotes. Mr. Chas. G. Poole, in charge, placed two hunters and trappers in the lava beds, who succeeded in destroying the pests at the rate of approximately fifty coyotes per month. Up to this writing, approximately two hundred coyotes and wild cats have been destroyed. By this assistance, the Biological Survey will save hundreds of deer for the state.

The sage hen is almost extinct in Modoc County. This last season very few hunters were able to bag a limit of the defenseless birds. In the first place, a great mistake was made when August 1 was set for the opening date of sage hen season. This season there were very few young birds. Those found on the first of the open season were only about one-third grown. Even with better laws, it will take years to reinstate the sage hen to its former condition.—Geo. W. Courtright, Straw, California.

#### OREGON SPORTSMEN PROTEST.

Sportsmen living in the Klamath Falls district in Oregon complain that they are unable to utilize deer killed within the State of California. This district is unfortunate in that politically it is a part of Oregon but geographically a part of California. The securing of a nonresident license to hunt in California does not make it possible for them to carry their kill back into the state of Oregon. As a consequence, these Ore-

gon hunters must eat up their venison while in the State of California and can not even take back the trophy until it is properly mounted. Some adjustment will doubtless be worked out to cover this situation.

#### **ROOSEVELT WILD LIFE STATION.**

Several years ago the Roosevelt Wild Life Experiment Station was established at the New York State College of Forestry "to commemorate the achievements in wild life and forest conservation of New York State's most distinguished citizen and hunter naturalist." This station's staff, headed by C. C. Adams, includes several well-known scientists who are devoting their time to research related to forest wild life. It is the endeavor of the station, through field and laboratory study, to develop new or improved methods of increasing the forest production of fish, fur and game animals and to show their application to general forest management. Among the completed projects is a biological survey of Palisades Interstate Park.

In the summer of 1921, a survey of beaver in northern Herkimer and Hamilton counties, New York, was undertaken, and in the summer of 1922 the beaver in Yellowstone National Park were studied. Roosevelt Wild Life Bulletin (Vol. 1, No. 2) contains the published results of these investigations under the authorship of Dr. Chas. E. Johnson and Mr. Edward R. Warren, respectively. The papers are well illustrated and both emphasize life history and habits. Considering the time the authors spent in the field, the results give promise of further splendid contributions to knowledge concerning the life and habits of this most noted of fur bearers.

There is a dearth of fundamental knowledge of the life history and habits of fish and of game and such an institution as the Roosevelt Wild Life Experiment Station has unlimited opportunity to supply this need. It is to be hoped that institutions of this kind will spring up in every state, so that sound knowledge may replace guess work and the results of scientific research come to form the basis of protective legislation.

#### **SANTA BARBARA TO FRAME PROTECTIVE LAWS.**

The city park commissioners of Santa Barbara are making a progressive and commendable move in the direction of a city ordinance which will make of all their city parks wild life refuges. For several years a pond in one of the city parks

near the shore has been designated by the commissioners as a refuge for water birds. Owing to the general prohibition of the use of firearms within the city limits, the ducks which flock there have learned to feel themselves so safe that poachers now find it an easy matter to approach them near enough to throw clubs and stones with stunning or fatal effects. There seems to be no statute, city, state, or federal, which makes this a legal offense during the open season on waterfowl.

Not only does the protection of wild fowl add to the delights of these parks, but Oakland has gained fame for Lake Merritt as a refuge for ducks and other water birds, and for the annual duck pageant held there. Waterfowl at Golden Gate Park, San Francisco, are also a great attraction. The establishment of such refuges in the heart of a city affords pleasure to the numerous park visitors, has great educational value, fosters the love and appreciation of birds, and ultimately serves the interests of true sportsmen.

#### **FOX FARM TO BE ESTABLISHED NEAR SAN BERNARDINO.**

California is to have another fox farm. Mr. Jacob Host, who represents the Bear Lake-Silver-Black Fox Ranch Company, owners of two established fox farms in the middle west, is in charge of the new enterprise. He has been granted a permit by the United States Forest Service to occupy twenty-two acres of land in the Cajon Pass just north of San Bernardino. Here the company contemplates the installation of an ice plant to preserve the food, the keeping of goats for milk, and the raising of poultry for feed.

The Bear Lake-Silver-Black Fox Ranch Company expect to ship thirty pair of foxes to the new California farm.

#### **GAME LAW CHANGES IN OTHER STATES.**

Interesting recent modifications of state game laws are as follows:

New Jersey requires persons hunting woodcock from October 1 to November 9, to take out a special license costing \$2, in addition to the regular hunting license. Chinese and ring-necked pheasants are now protected throughout the year for an indefinite period in Maryland, where an attempt is being made to establish the species. Virginia prohibits the baiting of wild turkeys or the taking of their eggs except for propagating purposes under permit from the commissioner. The closed season for quail in Massachu-



setts has been continued until 1925 in Dukes, Essex, Hampden, Middlesex and Nantucket counties.

The open season for big game has been reduced in several instances. A law was passed in Virginia sanctioning the practice of the department of game and inland fisheries of establishing game refuges on private lands by contract with the owners. All lands so set aside are required to be conspicuously posted as state game sanctuaries.

A summary of the provisions of Federal, State and Provincial Statutes, and a list of officials from whom copies of state game laws may be obtained, is contained in Farmers' Bulletin 1288, Game Laws for 1922, by George A. Lawyer, chief United States game warden, and Frank L. Earnshaw. The bulletin is available free upon application to the United States Department of Agriculture, Washington, D. C.

Regulations pertaining to the propagation and sale of migratory waterfowl and game are given. The text of the Lacey and Migratory Bird Treaty Acts and regulations pertaining to this country and also in Canada are included.

#### MOURNING DOVE A MIGRATORY BIRD, COURT DECIDES.

The mourning dove, known in some localities as the Carolina or turtle dove, is a migratory bird coming within the protection afforded by the Migratory Bird Treaty and the Act of Congress to give it effect, although individuals of the species remain within the borders of certain states the entire year. This decision was rendered in the case of the United States against Joseph H. Lumpkin, brought to trial at Athens, Ga., November 14, before Federal Judge S. H. Sibley and a jury.

The defendant, who was charged with killing mourning doves during the federal closed season, contended that the birds which he had killed had not migrated but had remained in Georgia the entire year, and for this reason were not covered by the federal statute. The case, which attracted widespread attention, was attended by prominent attorneys of Georgia.

The court held as a matter of law that the mourning dove is protected by the Migratory Bird Treaty Act and Regulations, and instructed the jury that the only question of fact to be decided by it was whether the defendant actually killed mourning doves in the closed season as charged in the indictment. The trial consumed two days and resulted in the jury returning a verdict of guilty, and the imposition of a fine of \$25 and costs.

#### BEAVER FARMING PROMISING IF PROPERLY CONTROLLED.

Beavers are of importance as fur-bearers and conservators of water and soil. Their unique habits make them animals of general interest. In certain types of forest country, or farms, in irrigation ditches, and along trails, roads, and railroads, they are capable of doing serious damage. It becomes necessary in such cases to remove them or to control them intelligently.

Their control, however, is not difficult. United States Department of Agriculture Bulletin 1078, Beaver Habits, Beaver Control, and Possibilities in Beaver Farming, by Vernon Bailey, of the Bureau of Biological Survey, discusses in detail the kinds of traps, fences, and other control measures which have proved satisfactory. The bulletin also points out that beaver farming may prove a successful branch of fur farming if carried on in suitable localities. Beavers in our national forests if properly controlled, would conserve water and soil, weed out timber of little value, and yield good returns in fur. In connection with projects for reforestation with conifers on well-located, burned and cut-over timber lands, beaver culture might prove profitable. These lands are frequently covered with a second growth of aspen, willow, and pin cherry, which are ideal food for beavers, while having little commercial value.

Aspens and willows are abundant also in the certain northern areas of Canada and Alaska, where beavers were formerly very numerous. In such areas experiments might be made to determine the practical possibilities in beaver farming.

Only two centuries ago beavers inhabited the greater part of the North American Continent and were an important source of food and warm clothing to the native people. Traffic in their skins promoted early settlement of the country. They have been exterminated over much of their area by intensive trapping, but for the last 20 years they have been given special protection in many sections of the country and under favorable conditions have thrived and increased rapidly.

While it would be obviously unwise to restore the animals to cultivated fields and orchards in agricultural areas, there are still many localities where they could be introduced without harm. By storing water in the reservoirs along mountain streams they would help prevent floods and extensive erosion and would increase stream flow in dry weather.

Beavers with the darkest, most beautiful, and most valuable fur are found along the southern shore of Lake Superior, in Wisconsin and Michigan. In other locali-

ties the fur is paler and less desirable. In making suggestions relative to raising beaver for fur, the importance of using the best types of animals for breeding stock is emphasized.

Department Bulletin 1078 describes in considerable detail the interesting life and habits of beavers, which rarely dig on the surface of the ground and never make a burrow with an exposed entrance. In carrying materials they use their strong incisor teeth for transporting logs or large pieces of wood, and for mud and small sticks and twigs from the bottom of the pond to be placed on the dam or house, they use their forelegs as hands and arms. The flat heavy tail is a rudder or propeller in the water and a prop or brace on land.

Beavers occasionally damage choice trees but the most serious damage is occasioned by their dams, which raise the water levels in streams, ponds, or lakes, flooding low ground and frequently killing great areas of valuable forest trees. When railroad grades are flooded in low ground the result may be serious. A suggestion is made in the bulletin for using an outlet pipe to keep beaver ponds at a desired level as one means of preventing heavy damage. One of the simplest and most important means of beaver control is fencing. Many of the woven-wire stock-fences are satisfactory. Full directions for trapping with various types of traps are given in the bulletin. Light-furred pelts bring from \$6 to \$8 each, heavy dark-brown skins from Canada and Alaska bring from \$20 to \$25 each, and the rare "black beavers" from the south shore of Lake Superior from \$38 to \$50.

#### LIFE SENTENCE FOR MURDER OF FEDERAL GAME WARDEN.

For the murder of Edgar Lindgren, United States game warden in charge of the Iowa district, the maximum penalty, life imprisonment, was imposed upon Louis Esposito, who was convicted by a jury October 11. Warden Lindgren was shot and fatally wounded while discharging his duties near Big Lake, Iowa. While patrolling he encountered three Italians hunting in violation of the federal laws. Lindgren attempted to arrest them, and one of the three fired at him, almost blowing off his right hand. When the warden turned to get under cover he was shot twice in the back and once in the side. Esposito's brother, Sebastiano, is facing trial on the same charge. The third man is not charged with actually shooting at Lindgren.

#### MIGRATORY BIRD LAW ENFORCEMENT.

According to the last report of the Chief of the Bureau of Biological Survey, from 25 to 28 regular salaried wardens were employed in the enforcement of the Migratory Bird Treaty Act. These were aided by 48 United States deputy game wardens, receiving a salary when employed during short intervals in emergencies, and by approximately 350 United States deputy game wardens stationed at suitable points throughout the country, who receive a nominal salary of \$1 per annum and cooperate by reporting violations, thus bringing about better observance of the law.

During the fiscal year 194 convictions were obtained out of 772 cases pending. California is credited with but two of the convictions obtained in federal courts.

#### TOADS OF SOME USE IN CURBING CERTAIN PESTS.

Toads have been reputed to aid in curbing the numbers of injurious insects and other similar pests. To ascertain the facts in the case the Biological Survey of the United States Department of Agriculture has analyzed the contents of the stomachs of 502 common toads, and reports that while the findings regarding the choice of food are of interest they thus far fail to demonstrate that toads are of great economic importance. Toads go constantly about their own work of gaining a livelihood, and so undoubtedly fill their proper place in nature. They are never very numerous in one locality, however, and as they can not adopt the methods of birds and traverse wide stretches of land to aid in combating abnormal local increases of crop and garden pests their influence is not strongly felt. The investigation shows that a certain portion of the toad's food is made up of injurious insects and other pests of growing plants, and that the toad performs some service in such places as greenhouses, gardens, fields of small grain, and golf courses. Any harm that toads do in the consumption of beneficial beetles and other insects useful to man is of little economic importance and does not warrant their indiscriminate destruction.

#### THE BODY TEMPERATURE OF BIRDS.

Every student of zoology is taught that certain vertebrates have a body temperature below the temperature of the human, and hence are called cold-blooded ani-

mals, whereas others of a body temperature about the same or greater than that of the human, are called warm-blooded animals. It is not often, however, that an explanation is given of the underlying cause for this difference in temperature.

A study of the body temperature of birds, by Alexander Wetmore, published in the Smithsonian Miscellaneous Collections (Vol. 72, No. 12, pp. 1-52), explains a certain diurnal variation in the temperature on the basis of the metabolism of the individual as reflected by its activities. With birds there is no constant relation between the normal temperature of the surrounding medium and the body cavity such as we find in cold-blooded animals.

Body heat in all animals is caused by tissue changes during active work performed by various organs or parts. In the group that we class as warm-blooded, these changes are more rapid and intense, so that heat generation may be in excess of heat radiation. There is a more perfect control of heat radiation in the warm-blooded group.

Of particular interest is the evidence presented to show that the air sacs which are found within the bones of birds have a relation to body temperature. With animals as active as are birds, means of relief for over-heating must be well organized; the extension of the air sacs through the body cavity is excellent for this purpose.

The rare occurrence of frozen feet among birds is not, as yet, possible of explanation.

"It may be assumed as certain that heat production and local control are under nervous direction and that these two functions are directly concerned in whatever mechanism has developed for temperature control.

"It seems probable that in our living fishes there is little actual temperature control. In Amphibia [toads, frogs and salamanders] this regulation is developed

to some extent and it has progressed somewhat farther in modern reptiles. In the bird, however, the regulation of body temperature has reached its highest point, though birds stand second to mammals from an evolutionary standpoint. Proof of this is found in the fact that birds have the highest body temperature known, and that none of them hibernate (in spite of ancient belief to the contrary)."

When ranged by families, the highest temperatures noted are to be found in pigeons, cuckoos, woodpeckers and in the perching birds, beginning with the flycatchers and ending with the thrushes. The swallows as a group, possess the lowest average body temperature, only the rough-winged swallow showing an average body heat above 107.5 degrees. On the other extreme, in the family of flycatchers, there are five species in which the mean temperature for male or female is 110 degrees, or more, and seven other species of birds hold the same record. The highest average temperature for both sexes is that of the western wood peewee with a mean of 110.2 degrees. The highest single reading believed to be valid was found in this species when the temperature was taken of a bird killed in the Graham Mountains of Arizona, which registered 112.7 degrees.

Although independent of external temperature, the temperature of a bird appears to advance a few degrees as the day advances. With the exception of the phalarope, the avocet, and certain other shore birds, where the male performs the duties of incubation, the body temperature of the female is slightly higher than that of the male.

Full summary of records of the body temperature of 327 species of birds are appended, together with a supplementary table of temperatures taken from available literature which adds temperatures for 92 species. The short bibliography shows that little has been written along this line heretofore.—H. C. Bryant.



## FACTS OF CURRENT INTEREST.

The open season on waterfowl has proved a splendid one for the hunter. Ducks and geese have been plentiful.



Fall spawntaking operations on the Klamath closed on November 15th, after a most successful season. At Klamathon 20,000,000 salmon eggs were secured.



A wonderful concentration of ducks and geese in the Butte Creek district west of Marysville Butte has been evident this fall. Birds seemed to be numbered in the millions.



Several salmon, marked four years ago and liberated in the Klamath River, were taken this year during spawning operations.



During the past biennium confiscations of illegally taken fish and game amounted to over two tons of venison, 4,500 ducks, 25 tons of fish and 12 tons of lobsters and shellfish.



Brood trout at the Mount Shasta Hatchery will this year furnish 10,000,000 eggs. The pond system is responsible for a dependable supply of eggs.



The imports of fresh fish from Mexico in 1921 amounted to 6,699,817 pounds, as compared with 8,121,225 pounds the previous year. The principal species imported were barracuda, 3,036,262 pounds; flounders, 1,314,918 pounds; spiny lobster, 943,547 pounds, and white sea bass, 500,075 pounds.



Results of salmon marking experiments have shown that salmon from the Sacramento River migrate at least as far north as Shelter Cove, and that salmon from the Klamath River contribute to the catch at Monterey Bay.



|             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Shrimpshead |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

All amounts shown in pounds unless otherwise specified.



## NOTES FROM THE STATE FISHERIES LABORATORY.

WILL F. THOMPSON, Editor.

### THE LABORATORY STAFF.

Dr. Tage Skogsberg has accepted a position as research assistant to Dr. Kofoed of the University of California. Dr. Skogsberg has been engaged in writing a report upon the purse seine fisheries of Southern California, and plans to finish that in December, when he will leave to take up his new work. The laboratory members have enjoyed their association with Dr. Skogsberg and wish him good fortune in the change.

Mr. O. E. Sette, who has been at the laboratory since his graduation from Stanford University last June, leaves October 1 for Monterey. He is to work with Mr. W. L. Scofield there upon the preparation of a sardine report.

Miss Frances N. Clark, librarian and scientific assistant, has left on a leave of absence to undertake further work at Stanford University during the fall quarter. She is to return in January, 1923, and her place will be filled temporarily.

### THE ALBACORE RUN.

The run of albacore has this year proved disappointing, the season being relatively light and closing early. Some apprehension as to the condition of the fishery would seem necessary, since the lack of fish seems accompanied by a lack of older year classes. No definite statement as to the reality of this can be made, however, until the completion of the present work upon the life history of the albacore. It is unfortunate that it has not been possible to follow the complete course of the season's run because of the diversion of the assistants to other work.

### THE LIBRARY.

Due to lack of funds, no extensive additions have been made to the library during the past three months. As the library is vital to the prosecution of scientific work, it is hoped that this condition will soon pass.

### DEPLETION OR FLUCTUATION.

There is at present in progress a very animated discussion in British fishery circles as to the relative importance of natural fluctuations in abundance and over-fishing, as witness a recent meeting of the British Association for the Advancement of Science, addressed by a prominent member of the trade. The

lack of accurate data on catches made in past years seems to have provided room for very divergent views, and the failure of the enforced closed season of the war period to lead to a rapid recovery seems to have inspired various men to criticize the evidence for over-fishing. They demand, instead, an intensive study of the great natural fluctuations which occur.

That such a study is of the greatest importance can not be doubted, as at present it is not even known what fisheries are subject to great changes in abundance. It is commonly accepted that the cod and herring are such fisheries, but the knowledge of the subject as regards the majority of the species seems scant. It is worthy of note that this question as to the existence of great fluctuations is of the utmost importance to the Pacific Coast fisheries, such as albacore, and that the State Fisheries Laboratory has for one of its principal objects the detection of such fluctuations and a study of their causes. Every effort is being made, for instance, to follow dominant year classes in the sardine fishery.

The discussion as to the presence or absence of depletion from over-fishing in the North Sea has brought home in a vivid way the lack of accurate statistics there, and the trade itself is urging with considerable vehemence the institution of a competent statistical system. In view of the emphasis which has come to be placed upon the need for such, it is obvious that the government in California should spare no effort to maintain and improve the present statistical system.

In so far as over-fishing is concerned, critics have pointed out that there was not a rapid recovery in abundance of all fish in the North Sea after the war with its enforced closure of grounds, and have assumed that the lack of such a recovery proved the absence of over-fishing. It would seem to us, however, that such a conclusion is unjustified, and we will await with some interest the more careful summation of the evidence which we feel sure must follow the initial discussions. The conclusion seemingly involves the assumption that the reproductive power of the species is unhampered, and that there are no obstacles to recovery of lost ground. But depleted species must depend upon a lessened number of spawners, and it must make its way again into grounds occupied by other species of animals who have made good use of their opportunities in the past. A species of

fish, unhampered by man, is granted to have a natural limit of increase, but surely the conclusion has not been justified that the limiting influences operate only after a certain abundance is reached. It would, indeed, seem that no conclusion can be drawn from a single year's obser-

vation, and that a question as to the fundamental character of the existence of a species is raised. The evidence of future catches, and the more mature conclusions of North Sea naturalists will assuredly be of the greatest interest.

## CONSERVATION IN OTHER STATES.

### OPEN SEASON ON ELK DEMANDED IN WASHINGTON.

Certain hunters in Washington are drafting a bill to present to the Washington legislature which provides for an open season on elk previous to 1925, the time now set for the opening of the season. They contend that there are too many bull elks. Licenses issued are to be limited to bulls only.

It seems doubtful whether the herds of elk still remaining in the northwest can withstand an open season and many are demanding that a distribution to other parts of the state be made of animals taken from the present herd rather than a toll to be taken by the hunter.

### SOUTHWESTERN ALASKA FISHERIES RESERVATION.

On November 3 the President signed an executive order establishing a government fisheries reservation, including Bristol Bay, Kodiak and Afognak waters, and Cook Inlet, in southwestern Alaska. The text of the order is as follows:

#### EXECUTIVE ORDER.

Whereas it has become apparent that certain valuable fisheries of Alaska have been seriously impaired and are in danger of further depletion, and that it is necessary to establish authority to meet the exigency which has arisen for the protection of these fisheries, and

Whereas by Executive order issued under date of March 3, 1913, modified by an order of August 11, 1916, a reservation known as the Aleutian Islands Reservation was created, and by an Executive order under date of February 17, 1922, a reservation known as the Alaska Peninsula Fisheries Reservation was created, including therein the lands and the territorial waters of the United States contiguous to the lands covered by said executive orders:

Now, therefore, I, Warren G. Harding, President of the United States of America, by virtue of the power in me vested by the laws of the United States, do hereby set apart as a preserve to more effectively insure the protection of the fisheries and for their encouragement and development, in addition to the above reservations, a reserve of lands and

waters, which said reservation shall be known as the Southwestern Alaska Fisheries Reservation, which shall include all territorial waters, and the lands within one-half mile of the shores thereof, within the lines defined as follows:

From the northeasterly point of the Alaska Peninsula Fisheries Reservation at Cape Mensehikof, Bristol Bay, northwesterly to a point in latitude 58° 32' north, longitude 162° 12' west, off Cape Newenham; thence to a point in latitude 59° 15' north, longitude 162° 0' west; thence eastward along parallel of latitude 59° 15' north, to longitude 155° west; thence to a point in latitude 61° 20' north, longitude 151° 20' west; thence to a point in latitude 61° 20' north, longitude 150° 10' west; thence to a point in latitude 61° 35' north, longitude 149° 40' west; thence to a point in latitude 61° 35' north, longitude 149° 0' west; thence to a point in latitude 60° 40' north, longitude 149° 0' west; thence to a point in latitude 60° 40' north, longitude 151° 0' west; thence to a point in latitude 57° 30' north, longitude 151° west; thence to a point in latitude 55° 0' north, longitude 157° 0' west; thence to low-water mark at the eastern extremity of Foggy Cape on Sitwik Island; thence to point of beginning.

Fishery operations within the said Southwestern Alaska Fisheries Reservation shall be subject to such regulations and restrictions as shall be issued by the Secretary of Commerce, in addition to the general fisheries laws and regulations of the United States as administered by the Secretary of Commerce.

The reservation hereby established shall not interfere with the use of the waters, islands or other lands embraced herein for any purpose not inconsistent therewith, nor with the operation therein of the laws now or hereafter applicable to the public lands in Alaska, nor with the respective jurisdictions of the Secretary of Agriculture and the Secretary of the Interior thereover.

Warning is hereby expressly given to all unauthorized persons not to fish in or use any of the waters herein described or mentioned.

WARREN G. HARDING.

The White House, November 3, 1922.

### OREGON INTRODUCES MOOSE.

Recently several moose, the only ones in Oregon, were liberated in western central Oregon, in Douglas County on Lytle Creek, a tributary to Lake Tehkeniche. The moose were planted within two miles

of the ocean, along a low range of foothills while the shore of the lake has many miles of marsh land which is said to be well adapted for them. Oregon has a number of large game refuges, but none of them contain suitable marsh land for moose.

The Game Commission ordered six calf moose, three males and three females.. After arriving at Portland, one of the males died. The animals weighed about 250 pounds each, and were very tame. To give them every opportunity to become established, a man will keep a watch on them. This attempt to add another species of big game to the state is being watched with great interest by the sportsmen of Oregon.—OVERTON DOWELL, JR., Mercer, Oregon.

#### WEST VIRGINIA ORGANIZES WILD LIFE LEAGUE.

A Wild Life League, designed to stimulate the conservation of natural resources, has been established in West Virginia, and Mr. Howard H. Cleaves, formerly director of the Natural History Museum of San Diego, has been placed in charge. Branch leagues are being formed in all of the fifty-five counties of the state. A state convention, composed of delegates from all the various branches will meet annually. An illustrated monthly publication devoted to the interests of the out-of-doors in West Virginia is contemplated.

#### NEBRASKA ENUMERATES EXTINCT GAME.

A bulletin of the Nebraska Conservation and Soil Survey (No. 12) by R. H. Wolcott, entitled "Nebraska's game resources and their conservation," records eight species of big game mammals extinct, impounded or protected throughout the year. The number of game birds now extinct, or practically extinct, number twelve.

#### LARGE TAKE OF TROUT EGGS OBTAINED IN FISH LAKE, UTAH.

The Utah State Game Department and the Bureau of Fisheries obtained 6,000,000 eastern brook eggs from Fish Lake on the Fish Lake Forest, Utah, in 1921. This

is double the amount taken any other season and eggs were still available when the work closed. The increase in the amount of spawn of the eastern brook trout obtainable is credited by the Bureau of Fisheries to the consistent planting of three and four inch fish which has been done by the bureau since 1917, the total number planted by them being 141,000. Last spring nearly 10,000,000 eggs of rainbow trout were obtained from Fish Lake, making a total of at least 15,000,000 eggs taken during 1921.

#### MONTANA PLANTS WHITEFISH.

Montana has successfully introduced the Great Lakes whitefish, with the object of developing a commercial fish. The plant made in St. Mary's Lake is expected to eventually furnish the tables of Montanans with this most delectable food fish of the eastern United States.

#### OREGON ADOPTS POLICY OF NUMEROUS SMALL HATCHERIES.

Oregon has definitely decided upon the small hatchery with rearing ponds as against centralized hatcheries with larger capacity. The smaller hatcheries are situated near the localities where there is need for large plants of fry, and the fish, after being kept in rearing ponds at the hatchery, are liberated in nearby streams, or carried by auto trucks and planted by experienced hatchery men.

#### BIRD PROTECTION IN ITALY.

With regard to birds in Italy, Mr. Hawksley writes: "The last government introduced a bill for the better protection of birds in Italy, under the form of a national game law, but this shared the fate of its twenty-four predecessors in not being passed before the government was turned out of office. \* \* \*

"We have put an entire stop to the blinding of birds and the sale of blinded birds in the city of Rome, but it is carried on very largely in Umbria and Lombardy. Some years ago it was hoped to make a special effort for the protection of birds around the birthplace of St. Francis of Assisi, but the diversion of a legacy unfortunately prevented the carrying out of this purpose."—*Bird Notes and News*, X, No. 2, 1922.



## UNITED STATES FOREST SERVICE COOPERATION.

PAUL G. REDINGTON, Editor.

## FOREST SERVICE SUBMITS SUPPLEMENTARY GAME REPORT.

A supplementary game report was submitted to the California Fish and Game Commission, under date of December 15. It contains a summary of reports of the supervisors of the various forests, emphasis being placed on recommendations as to the open season and bag limit for deer, on the number of hunters, and the number of deer killed in the seventeen national forests of the state.

The following tabulation is based on the best information available, showing the numbers of hunters within each forest during the past season, the number of deer killed—for which there is a record, the breeding season, based on observations and the best information available, the supervisors' recommendations regarding the proper hunting season, and the bag limit, with the number of arrests and convictions secured by forest officers during the past year with the number of cases turned over by forest officers to your deputy state game wardens.

It should be remembered that the information is only an approximation, as there is absolutely no way of definitely determining the actual number of hunters

who visited each forest during the season. Also, the number of deer killed, as shown in the tabulation, is only the number which the local forest officers had definite knowledge of. It is believed this number is far less than the number actually killed as at present there is no way to make an actual check on the kill.

The rutting season is based upon forest officers' observations and observations of local people, coupled with the date when fawns are first seen in the spring in each locality. Many claim that the breeding season is influenced by the occurrence of fall storms and the variations in altitude. The supervisors have recommended hunting seasons that would practically expire before the beginning of the rutting season. They are nearly all in accord regarding the reduction of bag limit to one buck. The number of arrests made and convictions secured by forest officers for violation of the game law were cases where immediate action was necessary. Many cases were turned over to your deputy warden.

Practically every supervisor in the state has recommended against the use of dogs in hunting deer. Many sportsmen throughout the state also concur in this opinion.

| Forest              | Number of hunters | Number of deer killed | Beginning of rutting season | Hunting season recommended | Bag limit | Arrests by forest officers | Cases turned over to state |
|---------------------|-------------------|-----------------------|-----------------------------|----------------------------|-----------|----------------------------|----------------------------|
| Angeles -----       |                   | 18                    | Oct. 15                     | Sept. 16-Oct. 15           |           | 4                          |                            |
| California -----    | 5,000             | 2,000                 | Oct. 15                     | Sept. 1-30                 | 1         | 2                          | 1                          |
| Cleveland -----     | 3,000             | 215                   | Sept. 20                    | Sept. 1-30                 | 1         | 8                          | 5                          |
| El Dorado -----     | 3,000             | 300                   | Nov. 1                      | Sept. 16-Oct. 15           | 1         | 3                          |                            |
| Inyo -----          | 1,300             | 150                   | Nov. 1                      | Oct. 1-31                  | 1         | 2                          | 1                          |
| Klamath -----       |                   | 469                   | Nov. 1                      | Sept. 16-Oct. 15           | 1         | 3                          |                            |
| Lassen -----        | 3,200             | 400                   | Oct. 15                     | Sept. 16-Oct. 15           | 1         | 1                          | 2                          |
| Modoc -----         |                   | 300                   | Nov. 1                      | Sept. 16-Oct. 15           | 1         |                            |                            |
| Mono -----          |                   |                       | Oct. 20                     |                            | 1         |                            |                            |
| Plumas -----        | 1,800             | 239                   | Nov. 30                     | Sept. 16-Oct. 15           | 1         | 3                          | 8                          |
| Santa Barbara ----- | 3,000             | 345                   | Sept. 1                     | Aug. 16-Sept. 15           | 1         | 2                          |                            |
| Sequoia -----       |                   |                       | Nov. 15                     | Sept. 16-Oct. 15           | 1         | 1                          | 1                          |
| Shasta -----        | 1,130             | 417                   | Nov. 15                     | Oct. 1-31                  | 1         | 2                          | 3                          |
| Sierra -----        |                   | 250                   | Nov. 1                      | Sept. 16-Oct. 15           | 1         |                            |                            |
| Stanislaus -----    | 5,750             | 700                   | Oct. 15                     | Sept. 1-Oct. 15            | 1         |                            |                            |
| Tahoe -----         |                   |                       | Nov. 1                      | Sept. 16-Oct. 15           | 1         |                            |                            |
| Trinity -----       | 2,000             | 586                   |                             | Sept. 16-Oct. 15           | 1         | 1                          | 6                          |

## RECOMMENDATIONS.

Based upon the supervisors' recommendations included in this report, I desire to continue the recommendations submitted in my report of May 15, except as hereafter modified.

I can not urge upon your commission too strongly the desirability, both from a game conservation and fire protection standpoint, of having a uniform hunting season for the entire state. This season should not begin before September 16, and should extend not longer than one month, with a bag limit of one buck. If this can not be accomplished for the Coast

Range, then the state should be divided into two game districts, so far as deer are concerned—one to include the Coast Range and the other the remainder of the state. The hunting season in the Coast Range should not in any case begin before September 1, extending one month, with a one-buck bag limit.

I also wish to recommend a closed season of five years on mule deer in order that that species may not be exterminated.

Certainly the data included in this and my former report, which are based on the best information obtainable, amply justify these recommendations.—PAUL G. REDINGTON, District Forester.

## FISH AND GAME COMMISSION—STATEMENT OF EXPENDITURES

For the Period April 1, 1922, to June 30, 1922, of the Seventy-third Fiscal Year.

| Function                                        | Materials<br>and<br>supplies | Salaries<br>and<br>wages | Service<br>and<br>expense | Property<br>and<br>equipment | Total        |
|-------------------------------------------------|------------------------------|--------------------------|---------------------------|------------------------------|--------------|
| Administration:                                 |                              |                          |                           |                              |              |
| Commissioners -----                             |                              |                          | \$87 01                   |                              | \$87 01      |
| Executive offices -----                         | \$59 39                      | \$4,289 99               | 1,123 32                  | \$10 00                      | 5,462 70     |
| Printing -----                                  |                              |                          | 3,765 73                  |                              | 3,765 73     |
| Research and publicity -----                    | 13 50                        | 1,050 00                 | 212 86                    |                              | 1,276 36     |
| Accident and death claims -----                 |                              |                          | 451 48                    |                              | 451 48       |
| Department totals -----                         | \$72 89                      | \$5,339 99               | \$5,640 40                | \$10 00                      | \$11,043 28  |
| Commercial fishculture and<br>conservation:     |                              |                          |                           |                              |              |
| Superintendence -----                           | \$24 53                      | \$2,461 50               | \$1,083 70                | \$1 67                       | \$3,571 40   |
| Inspection and patrol -----                     | 1,009 42                     | 4,677 08                 | 986 93                    | 2 90                         | 6,676 33     |
| Research -----                                  | 23 57                        | 4,454 31                 | 455 28                    | 325 15                       | 5,258 31     |
| State laboratory construction -----             | 28 38                        |                          | 1 00                      |                              | 29 38        |
| Statistics -----                                | 280 39                       | 1,930 91                 | 157 93                    |                              | 2,369 23     |
| Market fishing license commissions -----        |                              |                          | 125 00                    |                              | 125 00       |
| Propagation and distribution of<br>salmon ----- | 2,130 20                     | 2,854 63                 | 562 73                    | 184 26                       | 5,731 82     |
| Department totals -----                         | \$3,439 73                   | \$16,378 43              | \$3,370 57                | \$513 98                     | \$23,702 71  |
| Sporting fishculture and conservation:          |                              |                          |                           |                              |              |
| Superintendence -----                           | \$33 73                      | \$2,280 00               | \$4,139 77                |                              | \$6,453 50   |
| General patrol (40 per cent) -----              | 189 43                       | 11,685 87                | 8,024 67                  | \$72 17                      | 19,972 14    |
| Propagation and distribution of trout -----     | 6,665 35                     | 18,218 68                | 6,599 02                  | 530 51                       | 32,013 56    |
| Department totals -----                         | \$6,888 51                   | \$32,184 55              | \$18,763 46               | \$802 68                     | \$58,439 20  |
| Game conservation:                              |                              |                          |                           |                              |              |
| General patrol (60 per cent) -----              | \$259 48                     | \$18,149 13              | \$18,207 52               | \$108 26                     | \$36,724 39  |
| Tahoe camping grounds -----                     | \$19 17                      | \$22 50                  | \$22 45                   |                              | \$64 12      |
| Grand totals -----                              | \$10,679 78                  | \$72,074 60              | \$46,004 40               | \$1,214 92                   | \$129,973 70 |



# PATROL SERVICE.

## SAN FRANCISCO DIVISION.

G. H. Anderson, Commissioner in Charge. J. S. Hunter, Assistant Executive Officer.

Phone Sutter 6100.

|                 |               |                  |                         |
|-----------------|---------------|------------------|-------------------------|
| W. H. Armstrong | Vallejo       | I. L. Koppel     | San Jose                |
| Earl P. Barnes  | Eureka        | Henry Lencioni   | Santa Rosa              |
| Theo. M. Benson | Fortuna       | Albert Mack      | San Francisco           |
| O. P. Brownlow  | Porterville   | B. H. Miller     | Ukiah                   |
| F. A. Bullard   | Dunlap        | E. V. Moody      | Santa Cruz              |
| J. L. Bundock   | Oakland       | W. J. Moore      | Napa                    |
| J. Burke        | Colma         | J. E. Newsome    | Newman                  |
| M. S. Clark     | San Francisco | Chas. R. Perkins | Fort Bragg              |
| S. L. N. Ellis  | Fresno        | E. W. Smalley    | Hanford                 |
| J. H. Hellard   | Laytonville   | H. E. Foster     | Launch "Quinnat," S. F. |
| J. H. Hill      | Watsonville   | Chas. Bouton     | Launch "Quinnat," S. F. |

## SACRAMENTO DIVISION.

F. M. Newbert, Commissioner in Charge.

Geo. Neale, Executive Officer.

Forum Building, Sacramento.

Phone Main 4300.

|                    |             |                |              |
|--------------------|-------------|----------------|--------------|
| T. W. Birmingham   | Red Bluff   | R. C. O'Connor | Grass Valley |
| S. J. Carpenter    | Maxwell     | E. D. Ricketts | Live Oak     |
| Geo. W. Courtright | Canby       | D. E. Roberts  | Murphys      |
| Euell Gray         | Placerville | J. Sanders     | Truckee      |
| W. J. Green        | Sacramento  | R. L. Sinkey   | Woodland     |
| G. O. Laws         | Weaverville | J. S. White    | Castella     |
| Roy Ludlum         | Los Molinos |                |              |

## LOS ANGELES DIVISION.

M. J. Connell, Commissioner in Charge.

Edwin L. Hedderly, Assistant.

Pacific Finance Building, Los Angeles.

Phones: Broadway 1155, Home F 5705.

|               |                 |                 |                |
|---------------|-----------------|-----------------|----------------|
| H. J. Abels   | Santa Maria     | W. C. Malone    | San Bernardino |
| J. J. Barnett | Ventura         | E. H. Ober      | Big Pine       |
| H. D. Becker  | San Luis Obispo | H. I. Pritchard | Los Angeles    |
| J. H. Gyger   | Elsinore        | Webb Toms       | San Diego      |



# 1921 ABSTRACT SPORTING FISH AND GAME LAWS 1923

OPEN SEASON INCLUDES BOTH DATES GIVEN

| SPECIES                              | DISTRICT                                                 | OPEN SEASON      | BAG LIMITS.<br>POSSESSION LIMITS, ETC.                                                      |
|--------------------------------------|----------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------|
| DEER                                 | 1-1 $\frac{1}{2}$ -4 $\frac{1}{2}$<br>23-24-25-26        | Sept. 1-Oct. 15  | Two Bucks per season.<br>No Does, Fawns, or Spike<br>Bucks. No sale of venison<br>or skins. |
|                                      | 2-2 $\frac{1}{2}$ -3                                     | Aug. 1-Sept. 14  |                                                                                             |
|                                      | 4                                                        | Sept. 16-Oct. 15 |                                                                                             |
| RABBITS (Cottontail and Bush)        | ALL                                                      | Nov. 1-Jan. 15   | 15 per day. 30 per week.                                                                    |
| TREE SQUIRRELS                       | ALL                                                      | Sept. 1-Dec. 31  | 12 per season.                                                                              |
| ELK, ANTELOPE, MOUNTAIN SHEEP        | ALL                                                      | No Open Season   | Killing Elk a felony.                                                                       |
| SEA OTTER, BEAVER                    | ALL                                                      | No Open Season   | \$1,000 fine for Sea Otter.                                                                 |
| BEAR, FUR ANIMALS                    | ALL                                                      | Oct. 15-Feb. 28  |                                                                                             |
| DUCKS, GEESE, JACKSNIPES, MUD HENS   | ALL                                                      | Oct. 1-Jan. 15   | 25 per day, except Geese,<br>8 Geese Weekly Limit.<br>See law.                              |
| RAIL, WOODDUCK, PIGEONS, SHORE BIRDS | ALL                                                      | No Open Season   |                                                                                             |
| QUAIL (Valley, Desert, Mountain)     | ALL<br>Except 1 $\frac{1}{2}$                            | Nov. 1-Jan. 15   | Valley, Desert, 15 per day.<br>30 per week.                                                 |
|                                      | 1 $\frac{1}{2}$                                          | Oct. 15-Dec. 15  | Mountain, 10 per day.<br>20 per week.                                                       |
| SAGE HEN                             | ALL<br>Except 4 $\frac{1}{2}$                            | Aug. 1-Sept. 15  | 4 per day. 8 per week.                                                                      |
|                                      | 4 $\frac{1}{2}$                                          | No Open Season   |                                                                                             |
| DOVE                                 | ALL                                                      | Sept. 1-Oct. 31  | 15 per day. 30 per week.                                                                    |
| GROUSE                               | ALL                                                      | Sept. 15-Oct. 14 | 4 per day. 8 per week.                                                                      |
|                                      | 1-1 $\frac{1}{2}$ -2-3-4-4 $\frac{1}{2}$<br>Lake Almanac | May 1-Oct. 31    |                                                                                             |
|                                      | 2 $\frac{1}{2}$                                          | July 1-Feb. 14   |                                                                                             |
|                                      | 23-24-25                                                 | May 30-Oct. 31   |                                                                                             |
| TROUT (Except Golden), WHITE FISH    | Lakes, Etc.*                                             | Aug. 1-Oct. 31   | See Game Law Abstract.                                                                      |
|                                      | 1 $\frac{1}{2}$ Winter                                   | Nov. 1-Dec. 31   |                                                                                             |
|                                      | 2-3-10 Tidewater                                         | Dec. 15-Feb. 28  |                                                                                             |
|                                      | 2-2 $\frac{1}{2}$ -10 Spear                              | April 1-Jan. 31  |                                                                                             |
| GOLDEN TROUT                         | ALL                                                      | June 30-Oct. 1   | 20 per day. None under 5 in.                                                                |
|                                      | ALL, Except 4e,<br>Clear Lake                            | May 1-Nov. 30    | 25 per day. None under 7 in.<br>No sale.                                                    |
| BLACK BASS                           | 4e, Clear Lake                                           | No Closed Season |                                                                                             |
|                                      | ALL                                                      | May 1-Nov. 30    | 25 per day.                                                                                 |
| SACRAMENTO PERCH, SUNFISH, CRAPPIE   | ALL                                                      | No Closed Season | See Game Abstract.                                                                          |
| STRIPED BASS, SHAD                   | ALL                                                      | No Closed Season |                                                                                             |
|                                      | ALL<br>Except 15                                         | No Closed Season | See Game Abstract.                                                                          |
| SALMON                               | 15                                                       | April 1-Aug. 31  |                                                                                             |
| CATFISH                              | ALL                                                      | Aug. 15-May 14   | Closed for commercial fishing.                                                              |
| CRABS                                | ALL                                                      | Nov. 15-July 30  | See Game Abstract.                                                                          |
| ABALONES                             | ALL                                                      | Mar. 16-Jan. 14  | See Game Abstract.                                                                          |
| PISMO CLAMS                          | 17                                                       | Sept. 1-April 30 | See Game Abstract.                                                                          |
| SPINY LOBSTER                        | ALL                                                      | Oct. 15-Feb. 28  | See Game Abstract.                                                                          |

\*Special provision see Game Abstract.

## HUNTING LICENSES

License Year from July 1 to June 30

Residents, \$1.00. Non-residents, \$10.00. Certain  
Aliens, \$10.00. Other Aliens, \$25.00.

## ANGLING LICENSES

License Year from January 1 to December 31

Residents, \$1.00. Non-Residents, \$3.00. Aliens,  
\$3.00.

## TRAPPING LICENSES

License Year from July 1 to June 30

Citizens, \$1.00. Aliens, \$2.00.